Popular Mechanics Magazine

REGISTERED IN U. S. PATENT OFFICE

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 33 FEBRUARY, 1920 No. 2

Modern Eskimos to Have Igloos of Concrete

THOUGH the snow blocks of the Eskimo igloo might almost class as permanent building material in the land of perpetual ice, their use does not accord with even the most primitive ideas of civilization. And it is a matter of governmental recognition that the Eskimo Indians of the Pribilof Islands are rapidly gaining in sophistication, as the prices of the sealskins and blue and gray-fox pelts they sell mount higher and higher. Those bits of frozen land in Bering Sea, whose total area is less than 70 square miles, have only about 350 inhabitants, yet they are being assailed by all the aspirations of prosperity, and are beginning to buy the most interesting items the mail-order catalogs offer. So United States engineers are building them igloos of concrete, thus substituting the most

Igloos of Concrete for the Eskimos of the Pribilof Islands: Permanent Habitations, Built by the Government, That Retain the Peculiarities of Native Architecture, Yet Substitute the Most Modern and Substantial of Materials for the Traditional Ice and Snow

substantial of materials for what seems, from the temperate-zone viewpoint, the most ephemeral. It is to be noted, however, that the builders are careful to adhere closely to the native style of architecture. The new concrete dwellings introduce no unfamiliar and depressing innovations to their tenants. If those built this season are accepted as satisfactory to the changing Eskimo taste, a whole colony of them will be constructed next summer.

PORTABLE CRIB FOR BABY LIKE TRAVELING BAG

The problem of carrying a baby from place to place has met with one solution in a handy "suitcase crib." A

This Chubby, Happy Infant Demonstrates Conclusively That an Outdoor Life in the Open Is the Most Healthful. The Photo Shows the Suitcase Open

steel frame, slightly larger than the ordinary valise, is covered with wire netting and hinged at either side of its gable top. The bottom is filled with soft bedding, and when the grip is closed it is strapped like any suitcase to insure double security. One healthy six-months old child has traveled with its parents all over the country in the portable crib, invented by its father.

The Proud Parents Carrying the Baby on One of Their Cross-Country Trips: The Baby Takes Quite Kindly to Its Suitcase Crib and is Here Sleeping Soundly in It

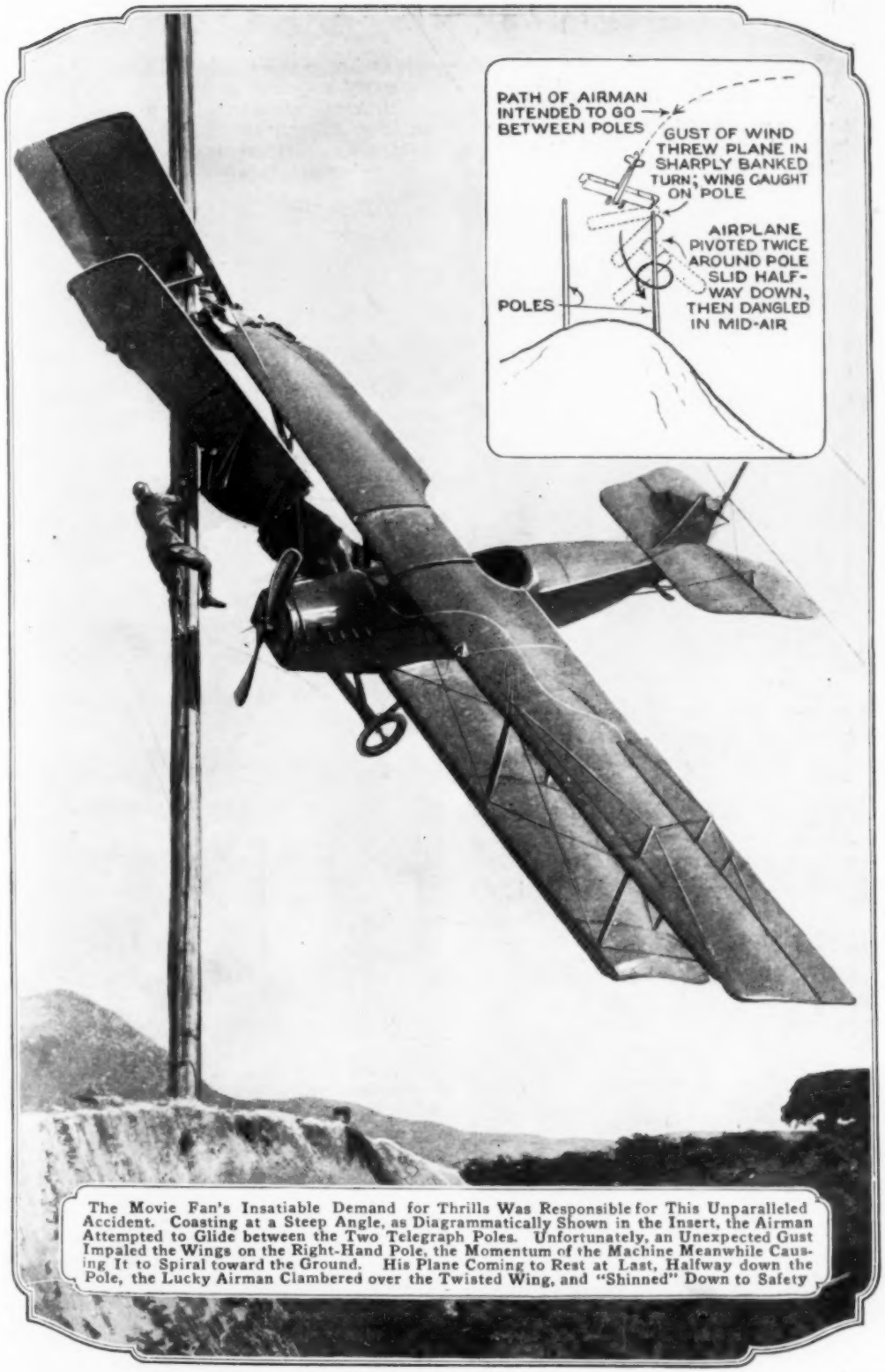
TRANSMIT POWER BY IMPULSES THROUGH COLUMN OF WATER

That a column of water may be made to transmit power in the same way that an electric wire transmits it, is the remarkable discovery of a European scientist, and the system already has been adapted for operating rock drills, replacing pneumatic equipment. In this application it is particularly useful, for the same water that operates and rotates the drill also removes the chips of rock. The power waves are transmitted through the water line with the same facility whether it is in motion or stationary, and may be generated and delivered at any desired frequency, or in more than one phase. Used for drilling granite in Cornwall, England, the special tools designed for the water-wave impulses delivered to the work 80 per cent of the generated power, as against only 10 per cent for air tools. For work under water and in mines, the new power should show many advantages.

AIRMAN MAKES SAFE LANDING ON TELEGRAPH POLE

While filming a comedy feature in California, an airplane was used to provide thrills for motion-picture patrons. A Los Angeles airman, who was employed to do the flying, tried to pass between two tall telegraph poles on the top of a hill, when his plane was caught by a sudden gust of wind. The airplane was thrown into a sharply banked turn, only to be punctured and held fast by one of the two poles.

The forward momentum of the plane was so great that it pivoted twice around the pole, then caught on the climbing cleats, and dangled in mid-air. The driver, after recovering from the shock and realizing that he was still alive and not traveling toward an undertaker's parlor in a gunny sack, climbed over the wreckage of the broken wing, and shinned down the pole like a lineman. He escaped without a scratch. The fire department later in the day removed the damaged airplane from its precarious position.


PATH OF AIRMAN INTENDED TO GO BETWEEN POLES
GUST OF WIND THREW PLANE IN SHARPLY BANKED TURN; WING CAUGHT ON POLE
AIRPLANE PIVOTED TWICE AROUND POLE SLID HALF-WAY DOWN, THEN DANGLED IN MID-AIR
POLES

The Movie Fan's Insatiable Demand for Thrills Was Responsible for This Unparalleled Accident. Coasting at a Steep Angle, as Diagrammatically Shown in the Insert, the Airman Attempted to Glide between the Two Telegraph Poles. Unfortunately, an Unexpected Gust Impaled the Wings on the Right-Hand Pole, the Momentum of the Machine Meanwhile Causing It to Spiral toward the Ground. His Plane Coming to Rest at Last, Halfway down the Pole, the Lucky Airman Clambered over the Twisted Wing, and "Shinned" Down to Safety

SEAT OF ODD BICYCLE PLACED OVER STEERING COLUMN

Seen from the side, the newest bicycle looks as though it had collided at high speed with a thick brick wall. Just above

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The Extreme Lightness and Compactness of This New Bicycle Recommend It for Use about the City Streets. It is Conveniently Carried into Office Buildings, Street Cars, or Elevators

the sprocket wheel the frame measures little more than eight inches from front to rear. The pneumatic-tired wheels are no larger, and are scarcely one foot apart. Yet the bicycle is built to carry a full-grown rider. Sitting directly above the pedal sprocket, he controls the front wheel by conventional handlebars. High gear ratio gives his strange vehicle good speed.

LABOR-SAVING DEVICE USED FOR MOVING BIG PIPE

By employing a very simple contrivance, certain middle-western tile manufacturers move huge concrete pipe sections

Moving a Concrete Tile: This Work Once Required Nine Men, but is Now Done by One Man and a Horse

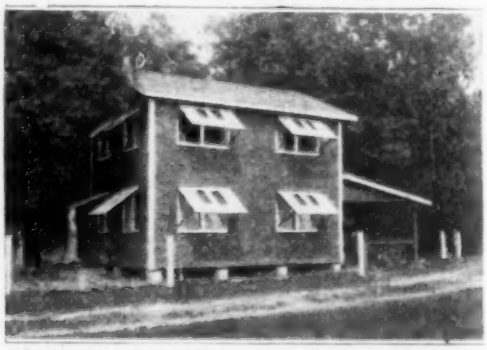
with a horse and a driver, though the task formerly required as many as nine men. Mechanical assistance is provided by a wooden roller, the axle of which is connected to a singletree with chains. When the roller is placed lengthwise inside a section, and a horse harnessed to the singletree, the animal can easily haul the ponderous cylinder.

GREASE EXTRACTED FROM WOOL BY NEW PROCESS

Lanoline, the purified animal grease extracted from wool, formerly was made mainly in Germany and Belgium, by a secret process known to have utilized sulphuric acid. A new process developed in Australia uses no acids, and consequently produces a grease of great purity. The method is declared to be highly economical, and provisions have been made for its use on a commercial scale. The product will be turned into soap for wool scouring, and other special purposes.

STOUT BOARD WINDOWS MAKE HOUSE BURGLAR-PROOF

A suggestion for the prospective builder of a summer cottage is embodied in the



Wooden Windows, of the Type Pictured Above, Are Inexpensive, Yet Thoroughly Hygienic. When Lowered and Locked, They Make the House Practically Burglar-Proof

description of a house recently erected by a disciple of the popular gospel of "fresh air." The man has done away entirely with the ordinary windows of glass; instead, he has equipped his home with windows of heavy board, hinged at the top, and pierced only for two small glass panes. When the windows are fully raised, the house is flooded with fresh air; yet they may be lowered and locked, when the owner leaves, so as to make the dwelling practically burglar-proof.

DIVER IN RIGID SUIT BREAKS RECORD FOR DEPTH

The Diver Is Helpless in His 400-Pound Suit Until Buoyed Up by the Water

PHOTOS COPYRIGHT, UNDERWOOD & UNDERWOOD

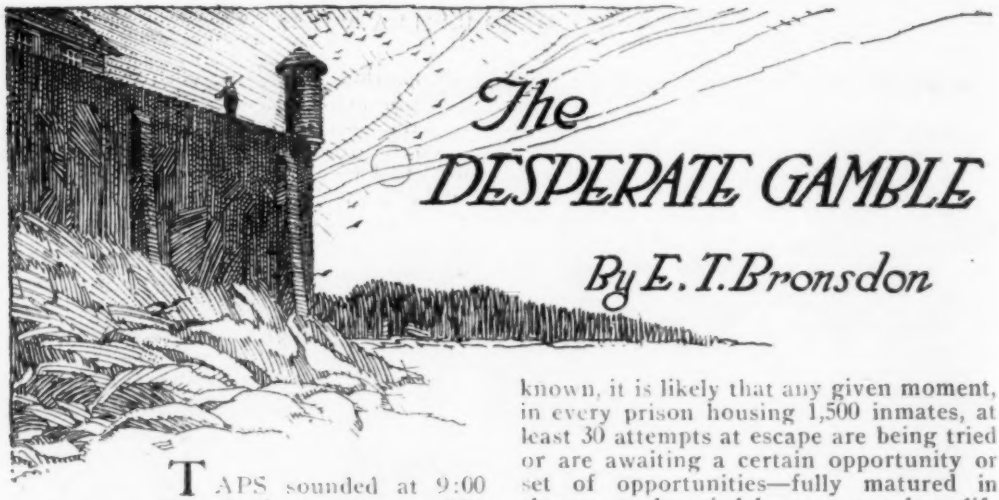
The Diver has Just Entered His Rigid Brass Casing in the View Above, and the Helmet behind Him on the Deck Is Next to be Bolted into Place. The Peculiar Shoulder, Hip, Knee, and Elbow Joints are Clearly Seen. Ready for Action, He is Hoisted over the Side with a Derrick, as in the Picture at the Left

Clad in a brand-new suit, made of rigid brass and weighing 400 lb., an American diver broke all records for depth a short time ago when he descended to the ocean floor in 360 ft. of water off the shore at Boston. The feature of the novel garment which made the feat possible is its resistance to water pressure, which at this depth is over 150 lb. per square inch. It is made of stiff, heavy metal, with circular joints at shoulder and hip, flanged and water-tight. Short sleeves of high-pressure fabric are inserted in the cylindrical legs and arms at knee and elbow, to give slight flexibility. The helmet is similar to the usual form. The diver, thus incased, is lowered by a derrick over the side of a ship, his depth limited only by the tackle and air hose. The new suit will be used to explore the sunken steamer "Laurentic," resting in deep water off the English coast with $30,000,000 in gold aboard. Remarkable electric-light photographs of the ship already have been made by a diver, using a special submarine camera and taking prolonged exposures.

DISCOVER SULPHUR IN CRATER OF ICE-COVERED MOUNTAIN

Located in the crater of a snow-capped volcanic mountain on Unalaska Island, one of the Aleutian group, is a large deposit of sulphur, believed to contain from 10,000 to 15,000 tons. A claim has been filed for the location, and mining operations probably will start in the near future. Subterranean heat and a hot vapor, the latter issuing from cracks in the rocks, keep the deposit free from ice and snow, though these permanently cover nearly all of the remainder of the peak, which is about 6,000 ft. in height. Another sulphur deposit has been discovered on Akun Island, in the same group, and a third near Stepovak Bay, on the southern shore of the Alaskan Peninsula.

¶ Automobiles are rented without drivers to persons whose cars are undergoing repairs by a Los Angeles garage. The idea has proved very popular, especially with women.



The DESPERATE GAMBLE

By E. T. Bronsdon

TAPS sounded at 9:00 p. m. For half an hour, while the "P. K."—principal keeper—was below the cell block, scarcely a sound issued from the 24 tiers. Then, some one way up in the fourth tier of the last section howled mournfully.

"1921! R-o-o-l-l a-r-o-u-n-d!" Immediately an answer.

"1926! R-o-o-l-l a-r-o-u-n-d!" Then another, who yet is wakeful.

"1933! R-o-o-l-l a-r-o-u-n-d!" This sends a shiver through an auditor. The poor devil up there actually is counting the days till 1933! His voice is dismal, yet in the same block is another man—sentenced only six weeks since. For the first time he adds his contribution:

"1949! R-o-o-l-l a-r-o-u-n-d!" There is a catch, as of fear, in his voice. In a few years this will have been replaced by spiritless resignation, perhaps. Right now even the others hate to hear him. Six or seven of them join in an instant chorus:

"Get a rope and hang yourself!" Cheerful advice, but the same that invariably is given a long-termer in the tiers, by his fellow convicts. Except for the fact that hope of a pardon, coming miraculously, burns in the breast of every man in for a long stretch, many undoubtedly would find the means and opportunity of following it just as given. One other hope, even dimmer, makes the lifers and the 30-year men plug along. This is the hope of escape, the hope of finding a chance for making that most desperate gamble, a break for freedom.

Men are few and far between who escape from state penitentiaries nowadays. Fewer still are those who break out and manage to evade recapture. Probably one in ten thousand is too large a number for the last class. Yet, if the full truth were known, it is likely that any given moment, in every prison housing 1,500 inmates, at least 30 attempts at escape are being tried or are awaiting a certain opportunity or set of opportunities—fully matured in theory—to be tried by men to whom life under restraint is absolutely without value. Each one feels in himself that if he once gets outside the walls, the "dicks" (plain-clothes men) never will bring him back—even though they caught "Shorty" and "Pug Nose" and "Butcher Hank," and all of his friends who had tried.

The prisoners who attempt to escape from a place like Clinton prison at Dannemora, New York—a penitentiary reserved for third-timers and really desperate characters, and where the percentage of attempted escapes is exceptionally high—have to be of an extraordinarily high standard of intelligence to succeed. Once in a decade or so such a genius appears. "Pepper Pete" was one of these.

Pepper got his cognomen from his method of highway robbery. Walking along the street in the evening, he carried an unlighted pipe between his teeth. When, in some lonesome spot, he saw a pedestrian stop to light a cigar, Pepper would accost him, asking him to "hold the match." When the fellow traveler obliged, Pepper, instead of lighting his innocent-looking pipe, turned it toward the eyes of his victim, and blew hard. The pipe was of special construction, and filled with red pepper. The victim, blinded by this horrible assault, could do nothing to defend himself until relieved of his valuables.

With two terms already behind him, Pepper was sent to Clinton. There he immediately began to plan an escape, and in his plans exhibited great cleverness.

He worked in the clothing shop of the prison. One piece at a time, working over a period of eight months, Pepper stole a complete civilian outfit from the shop. The ensemble he hid in his pillow. At daily inspection, of course, the pillows all

were felt and punched by the inspecting guard. He was looking for files, knives, saws, and the like, however, so the soft clothing got by undetected.

Then one day Pepper excused himself from roll call because of sickness, and started for the hospital. Stopping at the limehouse he changed clothes in a time that could not well have been longer than 45 seconds.

Attired then as a civilian, he slipped around to the administration building of the prison and walked boldly up the front steps. All the time, of course, he was in plain sight of the guards walking the high wall. None paid any attention to him, however, as prisoners in "civvies" aren't what they are accustomed to look for.

Banging his way in loudly, Pepper made for the warden's office. Without even knocking he stumbled in. The warden happened to be very busy at the moment, but this did not deter Pepper. "I've come to sell you some meat!" he declared confidently.

This attracted the warden's attention. "I don't need any!" he said brusquely, and turned back to work.

"But I'm going to sell you some!" asserted Pepper with strident confidence. "I live up country about three miles, and I got a couple of cows that cost too much to feed. I'm going to sell them to you cheap. You got a lot of men here to feed. Give them a good dinner once; why not?"

The warden was nettled. He received all his meat and other supplies by contract, and could not have used the cows had they been given to him. "Get out of here!" he retorted, rising and waving his arm. "I don't need your meat and I can't use it! Say—," and his expression changed. "How do you explain your being here at all?"

Pepper Pete was all ready for this, however. "Oh, I waited till the wagon came in. Then I rode in on it!" he explained, beaming appreciation of his own cleverness. "Now about the meat—"

"Sergeant!" bawled the warden. "Take this d——d pest and throw him out! He's bothering me!" The sergeant came in, and removed the obstreperous meat seller, dumping him outside the gates with force and relish. It was not until Pepper was across the 20 intervening miles to Canada that he really allowed himself a good laugh. Until, five years later, Pepper was foolish enough to return to New York, he stayed out of the clutches of the law.

In the whole history of the operation of Tombs, the jail of the city of New York, only one man escaped. This chap, B—— by name, mystified everyone until finally he confessed how it, and his other breakings, had been accomplished.

His sweetheart, steadfast to him even in the depths of adversity, had a special corset made for her, the like of which it is probable no other woman ever wore. In place of the first stay was a good, serviceable file, curved a little so it fitted. Next were a pair of saws; then cutting wire, with emery powder, knives, pliers, and other implements calculated to aid an impatient prisoner. With this amount of tools, in the space of eight hours, B—— cut through three sets of iron bars. He jumped 30 feet to the concreted prison yard, scaled a high wall, and jumped down the other side. His sweetheart was waiting, and spirited him away.

He was caught again, of course, and because of the reputation he had made by his first escape—and because it was a moral certainty he would try again—he was sent to Clinton. One would be inclined to think the sweetheart might have been excused for giving up then, as Clinton is considered one of the impregnable fastnesses in the country, but not she.

Bribing the driver of a supply wagon, she got him to drop a package of dynamite in the prison yard while the convicts were out taking their afternoon exercise. All being prearranged, B—— secured the explosive and somehow managed to smuggle it into the cell block. There, that night, he blew out the doors of his cell—and part of the prison, too—and in spite of shock and injuries, succeeded in getting out as far as the corridor. There a dozen guards nabbed him, however.

His last attempt was nipped in the bud. The woman, of whom the authorities now had become suspicious, was seen one day riding up near the prison on horseback and leading another horse. Anything like this is portentous in Dannemora, where no one except officials of the prison and State Insane Hospital reside. She was watched, and so was B——.

That night, after taps, a squad of 10 New York gangsters were caught attempting to scale the prison wall from the outside. They admitted coming to effect the release of B——, when put on trial later. The woman was indicted, and now is doing a stretch at Auburn, the women's prison. B—— never made another attempt; even his indomitable spirit wore out.

Who can tabulate all the heartaches

that lie behind these attempts for freedom? Usually the grind of incarceration is sufficient to make men dare all for a taste of liberty, but sometimes there are even more compelling motives.

A man named G——, in for 20 years, received word shortly after starting his sentence that his wife had given birth to a son. The baby was doing well, but his mother was in precarious health. She was not expected to live long. G——, right or wrong, went nearly insane brooding over his inability to go to her. He, with the help of three other men, worked out the details of a plot for escape.

"One piece at a time, working over a period of eight months, Pepper stole a complete civilian outfit from the shop. The ensemble he hid in his pillow. At daily inspection, of course, the pillows all were felt and punched by the inspecting guard. He was looking for files, knives, and the like, so the soft clothing got by undetected."

Near the prison laundry stood an empty barrel. Taking the bottom out of this, the four took turns at tunneling, aiming straight at the wall, two feet underground. The wall, of course, goes down to a depth that is impossible for prisoners to reach with the tools they are able to secure.

After two weeks of intermittent work, in which schemes of great ingenuity were concocted for the disposal of the dirt removed from the hole, they reached the wall, and excavated a small chamber there for working purposes.

With only a small file and bits of wood with which to attack the masonry, they pecked away. Finally one of the huge slabs was loosened, and worked forward to a point where it was almost about to topple into the excavation.

Here a terrible difficulty became apparent. It would be perfectly simple to release the slab, but the second it came out, it would crush beyond recognition the man working in the excavation. Beyond lay soft dirt, the surface—and freedom, however. The men talked it over gravely and decided that one of the number must be sacrificed that the other three might escape.

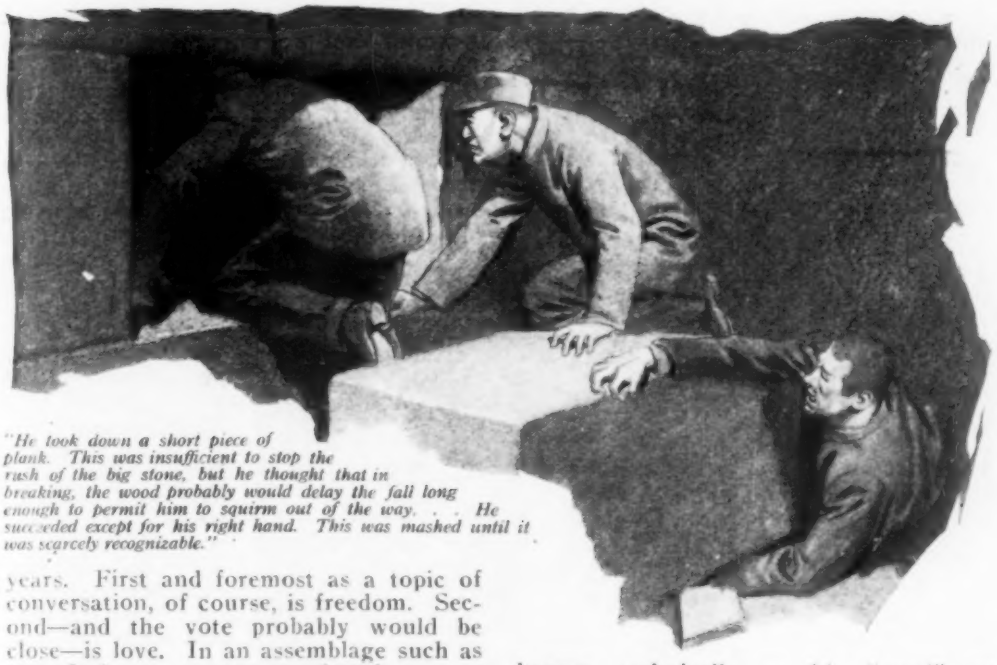
They drew straws. By ironic chance G——, the one of the four with more than an ordinary reason for escape, drew the shortest straw. His was the assignment. One of the others, proclaiming himself unattached, offered to take his place, but G—— refused. In the few seconds after his election he had formulated a scheme that might give him something of a chance to escape the slab when it fell.

He took down a short piece of plank. This was insufficient to stop the rush of the big stone, but he thought that, in breaking, the wood probably would delay the fall long enough to permit him to squirm out of the way. Propping it in place, he grimly worked the slab until it gave way.

It struck the plank, breaking it. Jumping back, G—— endeavored to get out of the way. He succeeded—except for his right hand. This was mashed until it was scarcely recognizable as a member. Gritting his teeth, he made no outcry, however, but turned to the work that yet remained.

In any other human pursuit save prison breaking, such heroism and self-sacrifice surely deserved success. Law is law, however, and transgressors pay in their heart blood as well as in restraint and humiliation. Just when the stage was all set for the escape, a "stool pigeon" in the cell block overheard the conspirators, and gave them away. The four men were captured and punished—and the mother outside died without seeing G—— again.

In the barred world men get down to fundamentals in the course of months or



"He took down a short piece of plank. This was insufficient to stop the rush of the big stone, but he thought that in breaking, the wood probably would delay the fall long enough to permit him to squirm out of the way. . . . He succeeded except for his right hand. This was mashed until it was scarcely recognizable."

years. First and foremost as a topic of conversation, of course, is freedom. Second—and the vote probably would be close—is love. In an assemblage such as one finds at a state penitentiary, one might expect to find the minds of the majority running toward license and dissipation, but this is not the case, at least in the average. Chivalry exists, and is made more of as a virtue than in the offices, elevators, street cars, and other assembling places of a care-free world. Whatever they were before they entered the confines of prison, men come to know that one of the surest sources of happiness is steadfast love. A surprising majority have wives or sweethearts who for five, ten, twenty years, visit the prison every time it is permitted—waiting with the man inside for the resumption of happiness. For the cynic, who believes that love between man and woman is not enduring, a term in—or even a visit to—a prison would be a revelation.

To show just what love comes to mean to a man incarcerated, the case of a chap named M——, at Sing Sing prison, may be cited. He had been sent in for a 10-year term under a state penalty. The way such a penalty works out is this: If he proves a perfect prisoner, and never is fined for any fault, he receives an allowance of two months from his first year's sentence; three months from the second; four from the third, and so on. This means that on a 10-year stretch he actually has to serve about seven years and one month. The two years and eleven months are taken off: these are known technically as his "good" or "short" time. If during his stretch he attempts to break out of prison, he instantly forfeits all this good time. It is gone forever; he must serve out his whole sentence and, besides, stand trial for the felony of jail breaking, for which an added penalty is imposed. In addition to these risks, of course, a man breaking out faces the very great probability of being killed or maimed in the attempt, or later, when the "dicks" and "bulls" get hot on his trail.

M—— had served more than six-sevenths of his sentence. During all this time his wife had visited him, coming once a month, as is permitted the first year, and once each fortnight thereafter. She came down with a mortal illness, and was dying. He told the grim story to his cell mate, who understood, sympathized, and agreed to help him even at the risk of losing his own good time, and thus forfeiting several years of his own freedom.

They stole straw and bits of stick, smuggling them into the cell. Then one afternoon M—— "hid out" in the greenhouse. His cell mate rigged up a dummy out of the straw, sticks, and a suit of prison-gray. When the nine-o'clock official count of the prisoners was made, the cell mate propped up the dummy facing him in the doorway. The "P. K." making the inspection was fooled. The count was given in as correct, the prison whistle

blew, and the guards left their posts on the wall for the night. Then M—— had a clear field.

He scaled the wall, swam the Hudson, and succeeded in reaching his wife. They had eight hours in which to say good-by to each other, and then the relentless police came for him. He did not resist rearrest, but instead, when put on trial, pleaded to assume the penalty given to his cell mate for aiding him in his infraction of the laws. "It has been worth it to me and Mamie," he said. Because of his previous exemplary conduct, and because the story was known to be genuine, he was given the minimum penalty, and the cell mate escaped with five days in the "cooler"—solitary confinement. Though this may sound harsh, it was the least the trial board was allowed to impose.

"His cell mate rigged up a dummy out of the straw, sticks, and suit of prison-gray. When the nine-o'clock official count of the prisoners was made, the cell mate propped up the dummy facing him in the doorway. The P. K. making the inspection was fooled."

It is not the purpose of this article to attempt to create sympathy for prisoners attempting to escape. Many of these are recalcitrants, men who have no other motive in trying to get away than a desire to resume their nefarious careers. While prison may not help them, it certainly does them no harm—and society is better off for the time they are behind the bars.

One of these "bad men," who finally was subdued, was a famous New York City gangster. His pals were of the noted terrorist faction known familiarly as the "gashouse gang." So defiant of the tenets of law and order was he that he caused a crimson banner to be flaunted from the building in which he lived to the tenement across the street. "No cops allowed," was the legend, and in all justice it must be stated that mighty few uniformed men had sufficient courage to disobey the mandate and enter the proscribed district. One Irish sergeant announced that he was going to call the bluff. He went down after one of the gang. In the morning he was found dead in the gutter, directly under the crimson banner.

The criminal in question finally was trapped, and given 20 years for manslaughter. When taken to Sing Sing he was asked, as a matter of routine, if he intended to behave himself. On giving a sulphurously negative answer, he was warned of the punishment meted out to recalcitrants. He sneered.

A short time later he picked up a door weight, weighing over 40 pounds, and threw it full into the face of a trusty, breaking the latter's nose and upper jaw, and knocking out eight teeth. When he was out of the cooler and back in the cell block again, his first act was to take a gun away from a guard, and chase the latter all over the prison yard, yelling fiendishly.

He was then taken to the Dannemora prison. At the time the latter prison was being built, the expectation had been that a great number of "hard nuts" would be sent there. A special solitary-confinement building, therefore, had been erected. This was a chalk box of a building, containing six cells. No windows opened from these cells, though, high above, each had a skylight. Herein a prisoner was allowed nothing but his own thoughts—plus three slices of bread and three cups of water a day. A physician examined him daily while here, to make certain that his physical being was holding up in good shape. The punishment was presumed to be sufficient to break the defiant spirit of the worst criminal—and it has not failed yet.

Up to the time of this gangster, no

prisoner had been given a taste of it. He was the first, and though he went in vowing all kinds of dire vengeance when once he got back again, less than one month with his own thoughts was sufficient to make him as meek as a woolly lamb. He has bothered no one since."

Certain insignia and privileges are given to prisoners who show themselves tractable and willing to reform. After a man has been in for one year without a fine or penalty of any kind, he is allowed to wear a bar beneath his arm badge. The badge is a circle about one inch in diameter; first offenders have white badges, second offenders blue, and old-timers red.

The first bar allows a prisoner to write and receive four letters a month instead of two, as is the case at first. He also may take a daily newspaper, and he may buy tobacco, tooth paste, and candy once each two weeks instead of once a month. Each year of good behavior adds another bar. The fifth year the bars are taken off, and a star is substituted. Star men are allowed two letters a week going and coming, and also are ready for appointments as trusties if they have not already been picked for some special work because of their talents or training.

If a man is fined, he gets a "bull's-eye" instead of the regular badge. This is similar, except for having another circle concentric with the first. The time of giving this mark is noted down, and a full year from that date must elapse before "good time" is given, or a bar awarded. Up to the limits of conscientious enforcement of the law, men are encouraged to be happy, ambitious, and to plan for a successful and honest career after release. Beyond that—well, it is prison, after all.

WELLS DRAW SEEPAGE WATER FROM FLOODED FARM LAND

The waters of the Snake River in southern Idaho have for years been impounded for irrigation purposes near Twin Falls. Several seasons ago, a fruit grower with trees in Rock Creek Cañon, at a lower level and several miles to the south, remarked that he had found it unnecessary to water his lands. The next year the cañon bottom became so swampy that his orchard was ruined. Other farms began to suffer, and the community grew alarmed. Investigation then showed that water was seeping copiously through the north wall of the cañon. Several preventives were tried, but all failed. At last, however, the experts engaged for this vital work evolved a solution of the difficulties. They dug wells everywhere. In these pits the seepage water accumulates, overflowing into contiguous ditches, which lead it harmlessly out of the cañon.

METAL SHORTAGE MAKES IVORY SCULPTURE GERMAN VOGUE

Germany's present shortage of gold, silver, and marble is said to be responsible for an interesting revival in that country of ivory carving, an art as old as man. Unable to work in the more precious metals and accustomed stones, artists are turning to this medium with an enthusiasm reminiscent of the 13th century, when French and Flemish sculptors produced marvels of workmanship for religious and secular ornament. The worthiest examples of the work now popular in Germany seem to be little statues which combine bronze and ivory in dainty

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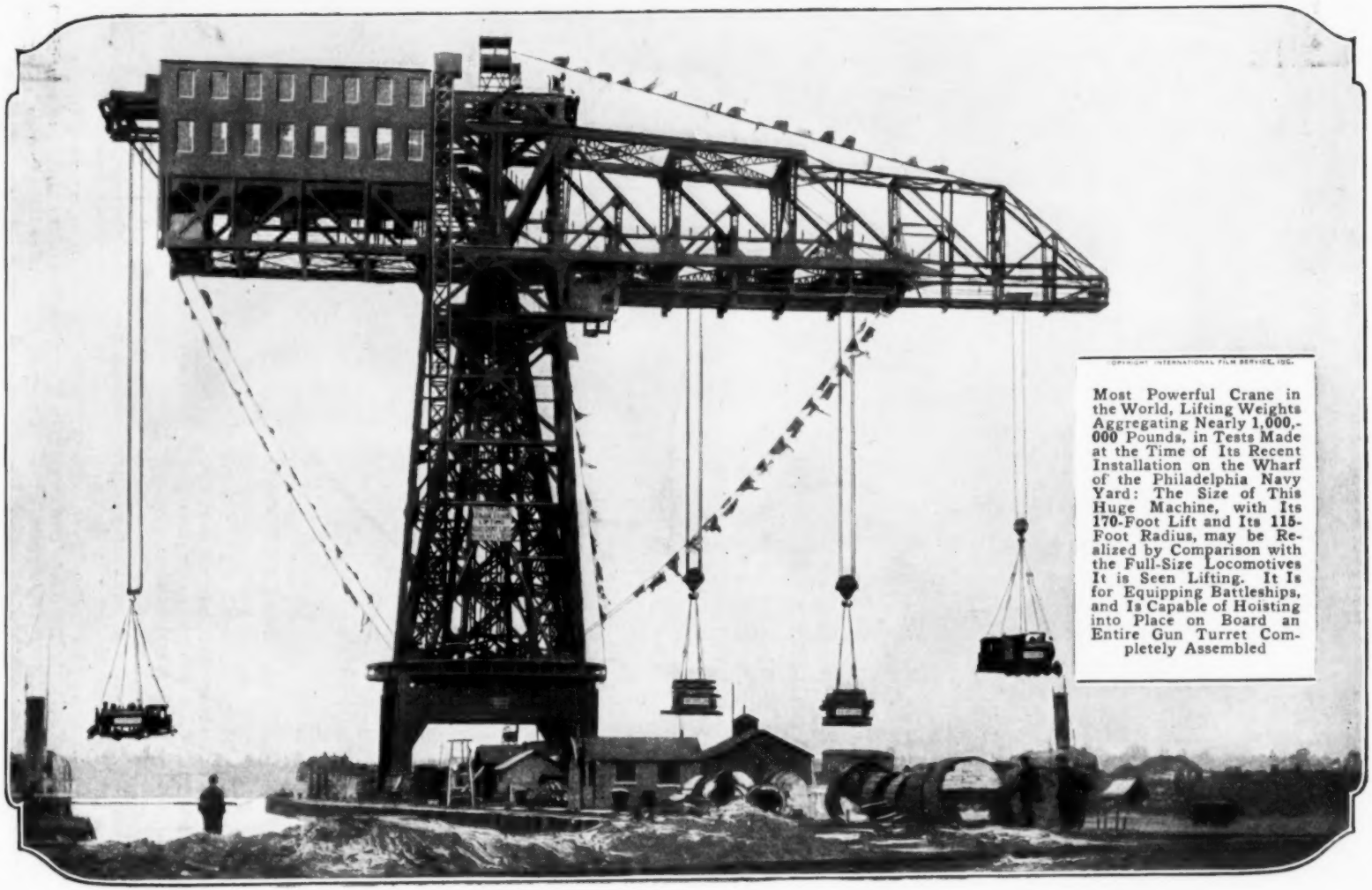
Unable to Obtain the More Precious Metals or the Usual Stones, German Sculptors are Finding Increasing Use for Ivory. It is Often Combined with Bronze, as in the Statuettes Above

contrast, the ivory being used to suggest the living flesh. Unlike their predecessors, however, the modern craftsmen use machinery for the rougher operations.



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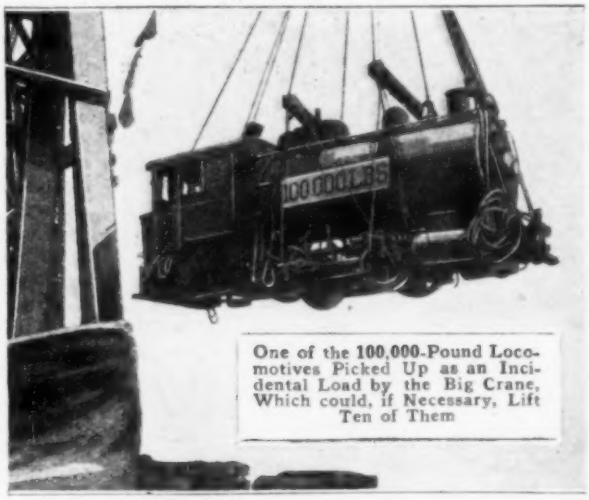
Most Powerful Crane in the World, Lifting Weights Aggregating Nearly 1,000,000 Pounds, in Tests Made at the Time of Its Recent Installation on the Wharf of the Philadelphia Navy Yard: The Size of This Huge Machine, with Its 170-Foot Lift and Its 115-Foot Radius, may be Realized by Comparison with the Full-Size Locomotives It is Seen Lifting. It Is for Equipping Battleships, and Is Capable of Hoisting into Place on Board an Entire Gun Turret Completely Assembled

POWERFUL CRANE LIFTS MILLION-POUND LOAD

With a working capacity of 350 gross tons, a radius of action of 115 ft., and a clear lift of 170 ft. from the dock, a new crane just installed at the Philadelphia Navy Yard claims the title of the world's largest hoisting machine. The big crane is of the cantilever type, with stationary pintle, the long arm of the hoist beam being balanced by the hoisting equipment and cab on the short end. Between the two 175-ton capacity hoist runways is an auxiliary hoist operating on a horizontal track. In the trials which accompanied the christening ceremonies, the huge machine lifted two locomotives with a weight of 178,000 lb., and additional loads which made the total nearly 1,000,000 lb. The new hoist is to be used for equipping warships, and is capable of loading completely assembled gun turrets directly from the dock to their position on board ship. It was constructed in 120 working days and has been subjected to exhaustive tests.



One of the 100,000-Pound Locomotives Picked Up as an Incidental Load by the Big Crane, Which could, if Necessary, Lift Ten of Them

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SALVAGE CREW ROLLS AERO ENGINE DOWN HILLSIDE

Weeks ago was told the tragic story of the snow-blinded transcontinental racing plane that collided with a mountainside in Utah. To that tale may now be added an interesting sequel. Reporting the condition of the wrecked plane, the survivor of the disaster described the Liberty engine as unharmed. So, with lifting tackle and skids for facilitating the long descent, a salvage crew was ordered to the scene. Their superiors figured that the journey down the snow-clad slope would take several days; but the men took with them, besides their tackle, a supply of good American gumption. Placing the 1,500-lb. mass of metal on the deep snow, they made it the center of a great snowball which they shepherded down the steep descent in just a few hours.

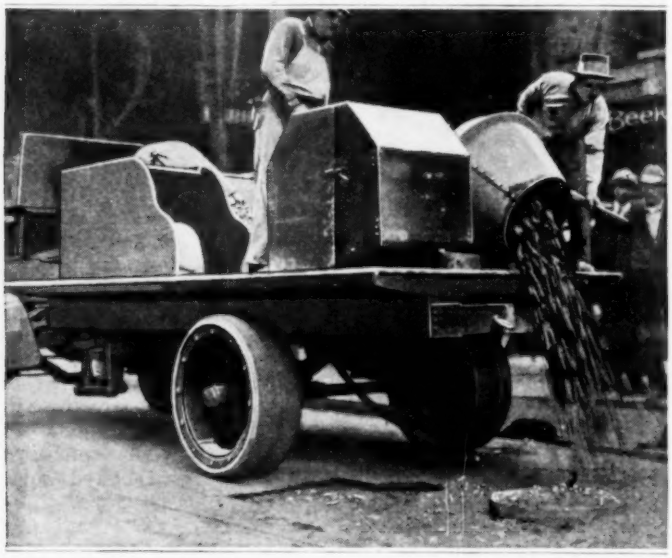
A Unique Salvaging Operation in the History of Aviation, This "Snowball" Descent of the Liberty Engine from an Airplane Wrecked High up the Mountain Was Entirely Successful and Took but a Few Hours

---

¶Tsingtao, China, has taken its place as a meat-producing district with the execution of a contract for 12,000,000 lb. of fresh beef, deliverable to an American concern. It is asserted that improved breeding methods will make China an important source of beef, as well as of swine and sheep.

STREET-REPAIR TRUCK FITTED TO ANSWER EMERGENCY CALLS

Like an emergency ambulance, the street-repair truck maintained by the municipal repair plant of New Orleans speeds at a moment's notice to any part of the city. With it, on the broad platform body, go every ingredient and tool used to mix and apply concrete. Immediately behind the driver's seat is the tool rack; then come three small bins containing sacked cement, crushed rock, and miscellaneous materials. Bolted to the rear end of the platform are a gasoline engine and a concrete mixer, the latter so arranged that the concrete may be dumped directly into the street.



On the Platform Body of This Four-Ton Truck are Carried All the Tools and Materials Needed for Small or Emergency Street Repairs about the City of New Orleans. The Location of the Engine-Driven Mixer Makes It Possible to Drop the Aggregate Directly on the Spot to be Repaired

NAVY OPENS SCHOOL TO TRAIN ENLISTED PHOTOGRAPHERS

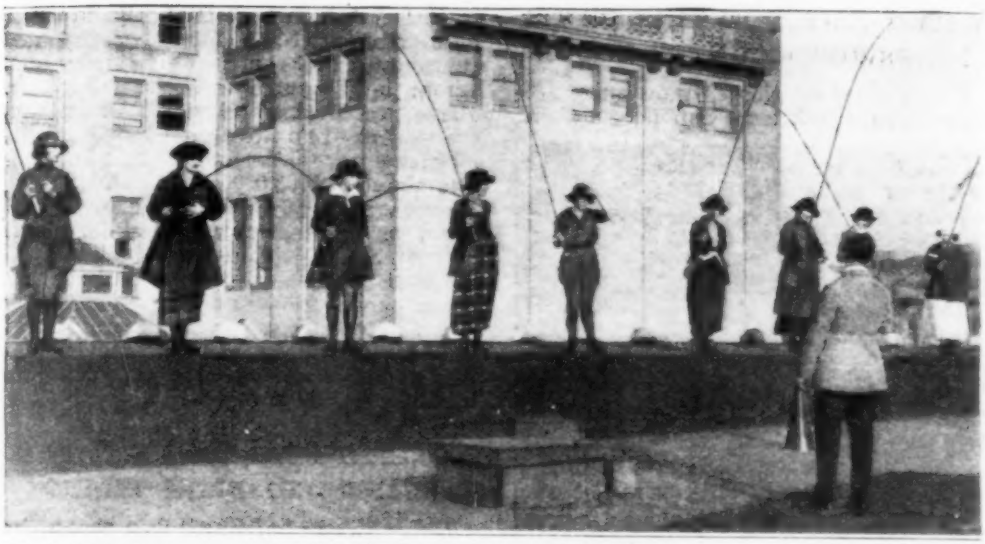
The camera is evidently to play as important a part in naval as in army operations; for at Washington, D. C., has been established a photography school for enlisted men of the navy. The first class, of 13 men, has already started its work, in the course of which the sailor-students will be instructed in photographic theory, aerial and ground photography, and laboratory practice. Graduates of the school will receive "photographic ratings" as their ability warrants, and will be assigned to duty wherever the navy needs them.

NAME OF NOTED POLICE FORCE CHANGED BY CANADIANS

Canada's famous law-enforcing organization, known since 1873, the year of its establishment, as the Canadian North West Mounted Police, has been renamed, and is about to undergo other important changes. The new appellation is the Royal Canadian Mounted Police. Plans are being made to move the headquarters of the force from Regina, Sask., where they have been located for 37 years, to Ottawa, Ont., and to increase the size of the territory to be patrolled by the scarlet-clad officers. It is possible that the entire dominion will be placed under their jurisdiction, though this has not been definitely decided. Special attention will be given by the policemen to the enforcement of the new prohibition law. Within the last two years approximately 1,300 men have been added to the body, which is now composed of 1,800 members, including the Dominion Police.

ELECTRIC AWL MARKS HUNDRED BUTTONHOLES AT A TIME

The demand for quantity production of ready-made clothing is responsible for the invention of another mechanical tailoring tool. This time it is an electrically operated awl, or needle, by the use of which a pile containing a hundred layers of goods can be pierced at will. With a master pattern spread on top, this means that a button or pocket can be located for a hundred suits with one downward motion of the awl. The long needle is revolved directly by a small electric motor, which is carried by a telescoping upright to permit easy movement up and down.



School of Fly Casting on the Roof of a Western Sporting-Goods Store: Eastern Ladies Vacationing in the West Learn Here How to Tie Their Own Leaders, to Make Their Flies Hit the "Water" First, and to Achieve Long Casts without Snapping Off Their Hooks

TROUT FLY-CASTING SCHOOL ON ROOF OF CITY BUILDING

A fly-casting school on the roof of a city building, in which many prominent society members and sportsmen are enrolled, has been established by a western sporting-goods establishment. The purpose of the school is the free dispensation of trout-fishing knowledge, which is expected to stimulate public interest in the Waltonian pastime, thereby exerting a wholesome effect upon the firm's business and increasing its profits.

The manager of the fishing-tackle department of the store, who is himself an expert angler, is the instructor in the school. The course consists of ten lessons on the roof, covering all the arts of tying lines, purposes of various flies, casting, etc. After members of the class have qualified in written examinations and practical demonstrations covering the subjects expounded in the roof lessons, excursions to near-by mountain streams by automobile follow. Here the students are taught all the various phases of stream casting, "whipping" streams, handling captured trout, and of avoiding line entanglements with rocks and brush.

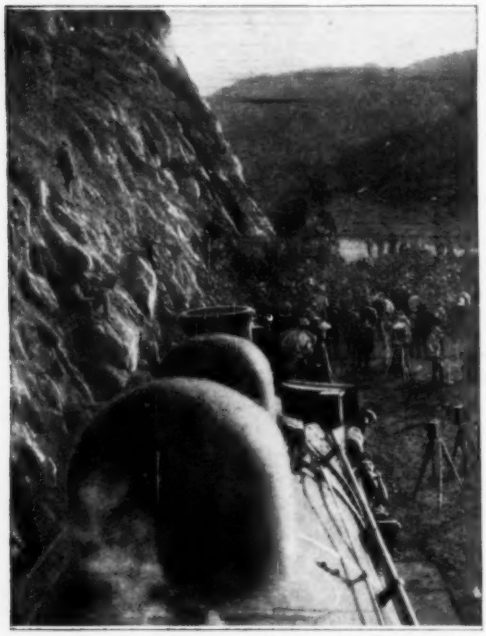
After Their Ten Roof Lessons, the Students Try a Little Field Practice, Many Good Trout Streams being Located within Easy Auto Reach of the Fly-Casting School Headquarters

and other fine points of the art. This innovation has proved as profitable as popular.

¶ Comfortable armchairs are to be placed on British battleships and cruisers for the use of enlisted men when off duty.

SHORT RAILROAD LINK OPENS NEW CROSS-COUNTRY ROUTE

Completion of the extraordinary 148-mile railroad link from San Diego, Calif., to Yuma, Ariz., whose final spike has just been driven at Carriso Gorge, opens a new transcontinental route. This curious line, whose brief course runs from 3,657 ft. above sea level to 49 ft. below it, was the subject of an illustrated article in this magazine for December, 1918. Its cost was about $18,000,000, or $120,000 a mile. By reason of its dip into Old Mexico to avoid an impenetrable mountain range, east of San Diego, it assumes an international character. It shortens the route across the country a good many miles, by connecting with a trunk line at Yuma. Mountain passes, tunnels, viaducts, and desert, all are crowded into its abbreviated measure.



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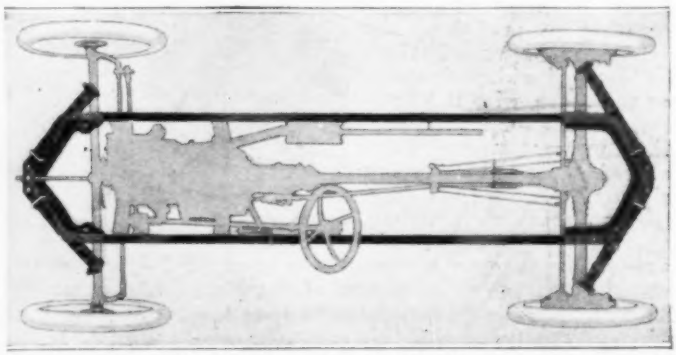
Driving the Golden Spike at Carriso Gorge That Completed the New Transcontinental Railroad Link, While the Locomotive Waited to Pull the First Train over the Shortened Route

CONCRETE CAISSONS FOR DAM SUSPENDED FROM PILING

Difficulties of building a dam across the Spanish River in Ontario, Canada, a swift stream, 135 ft. wide, flowing 45 to 55 ft. deep through rock, have been overcome by unusual means. Concrete caissons were built, not on the river bed, but on timber platforms supported by piling, above and below the dam location. As the concrete set, each caisson was lowered by screw rods, and a new section added from above. The suspended caissons, connected by sheet piling, form a cofferdam, in which the dam itself is being built.

SPRINGS OF NEW POPULAR CAR ARE PECULIARLY ARRANGED

Heretofore it has been a standard of automobile construction that the suspension springs were fastened to the frame within the area defined by the wheelbase. A new model of a popular small car departs radically from this arrangement. Its cantilever-type springs diverge at an angle from their frame fastening to the ends of the axle, like a broad "V" laid horizontally. The vertex of the "V" formed by the front springs is fixed to the frame at a point 15 in. ahead of the front axle. That of the rear springs is 15 in. back of the rear axle. Thus the distance between spring centers is 130 in., with a car wheelbase of only 100 in. The ends of the frame are shaped to a broad point to accommodate this peculiar spring arrangement. The finished car was given about 250,000 miles of severe road test before it was offered on the market, and unusual claims are made for the riding qualities contributed by the novel method of suspension.



Divergent Arrangement of Suspension Springs Allowing a Distance of 130 Inches between Spring Centers with a 100-Inch Wheelbase

COMMENT AND REVIEW

(These pages were printed Dec. 24, 1919.)

The Open Door

IN the solemn watches of a starless night, as though Nature herself would hide their shame, 249 men and women embarked from Ellis Island upon a Government transport, and sailed forth to an unknown destination. What they left behind they had neither learned to love nor understand.

When Columbus set forth upon his voyage to unknown lands, if indeed any should be found, that was a journey full of hope and courage. The sun shone brightly as if to light his way. The people gathered to gladden his departure. His face was set toward the direction of his voyage. In his soul glowed an inspiration which was one of the noblest the mind of man has ever conceived. Himself and valiant crews went out into the great unknown with the same uncertainty of return that we would incur today in sailing to some distant planet. But he was guided and supported by the glory of a great ideal.

Words are utterly inadequate to suggest the magnitude of the beneficent results to the entire world, as long as the Earth shall endure, of that voyage, among which not the least is this Land of the Free. A land which for 300 years has held out its inviting arms filled with hope and opportunity, to the downtrodden, the oppressed and distressed of all other nations. Not opportunity for a select few, but opportunity for even the least deserving, and their children's children.

To this land came millions; the doors swung wide open to admit them. They were accepted on faith, and the millions upheld that faith, and a mighty structure was builded, in which the smallest and the poorest was safeguarded in his rights which none might take from him. Then, in these latter days, came those others, with minds mean and selfish, who would tear down the structure, and plunge men into anarchy and revolution. They had nothing better to offer, nothing as good. What others had toiled and sacrificed to build up for the common good, they would destroy.

Madmen without balance or constructive ideas, to whom the sanctity of home and altar is but scorn and derision; beings who would hide the light of the church under the stifling smoke of the torch, and replace peace and prosperity with chaos and the horrors of the bottomless pit; fanatics who would poison the minds of the ignorant with promises that end only in despair, and fear; distrust and famine.

Such are they who sailed upon a voyage.

For years a long-suffering people held their hand. They permitted anarchy and revolution to be openly spoken and printed. They held their peace while agitators became more and more bold, in denouncing the most generous government on earth; while radicals spat upon those pages of history where our greatest men live in deeds eternal. Those of infinitesimal mind actually came to believe themselves great. They, too, each one, had their opportunity, but they refused to use it for good, and became instead a contamination.

And now, at last, that Government whom these pigmies would destroy, has reached out its strong arm. With no beating of drums or blare of trumpets, but in the sublime dignity of a hundred million right-minded citizens is its majesty disclosed. Out through the door, forever closed to them, have they gone. Gone to the place they came from, but their eyes are not set hopefully toward a great ideal; they go not to discover a new world for mankind; instead they departed looking backward at the land which will no longer tolerate their presence. As a flea might say to an elephant, their last words were, "This is the beginning of the end of the United States!"

Poor misguided mortals, who prefer the darkness of Russia to the torch of Liberty, which has now become for them a flaming sword. They are going to their own; to the place where the dagger falls in the dark; where one day an upstart puts a thousand innocents to awful deaths, and the next day becomes himself one of a thousand to die by his successor; where the hand of each man is set against another; where a few words of jealousy inspire loss of home and family; where the lives of women and children are but as blades of dry

grass in a raging fire. To the place where such things are, let all go who think and preach such awful doctrine.

More in a spirit of sorrow than revenge are these people deported. Most of them came to us amidst the squalor and discomfort of the steerage. As becomes a great Government, they are taken back under healthful conditions: their beds spread with clean linen; their food wholesome and abundant; their cabins light and sanitary. To the very last America returns them good for evil. Banished from the light of Liberty, their eyes are forever closed to it as though they were dead.

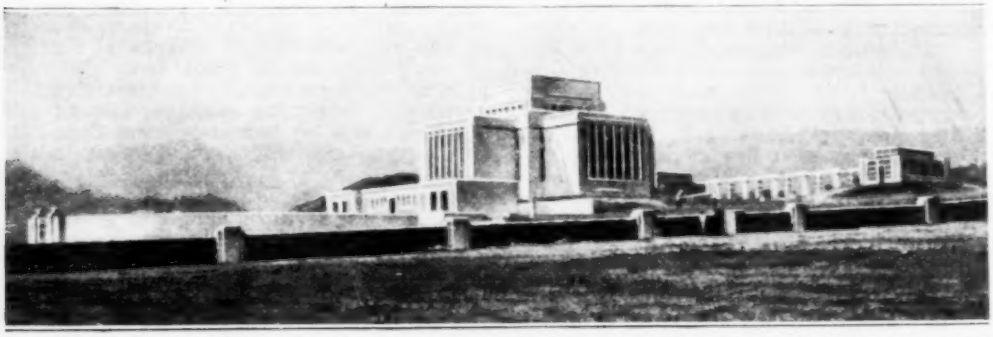
We have grown to be far too tolerant of our rights. What we need is a national purging of diseased citizenship. Let but a single case of bubonic plague land upon our shores and all the strength of Federal power throughout the land springs into action to restrain it. Yet here is a plague far more insidious and deadly, striking at the very roots of our national existence. Shall we be any less active in repelling a vastly greater danger because it is not a case for hospitals and doctors? If an enemy tried to land in force to destroy us, our coast guns would roar and their echoes would arouse the land to action between sunrise and sunset. Because this other danger has crawled in—like spies, one at a time—we have been careless and supine. Now let the menace be eradicated, root and branch.

For reasons, doubtless good, our Government has, in the past, been slow to act. Its leniency has been mistaken for license by the few, and has been a cause of deep apprehension to the many. But now a way has been found, it is the duty and privilege of all Americans to aid their Government to the utmost in the apprehension and deportation of these undesirables. From now on, let the work be fast and unrelenting. If any mistake is to be made let it be in favor of Americanism. Far better to deport a thousand of doubtful loyalty than harbor one single disloyal traitor. And duty rests on every one of us to help, not only by the spoken word but by individual effort. Let our secret service number one hundred million members. Let each be vigilant, watchful, and active, and strengthen the arms of the service by outspoken utterances of approval of what the Government has begun. Demand a speedy completion of the work; let our papers carry the message to every home; let our pulpits and platforms shout it aloud; in every school from the Atlantic to the Pacific, as young Americans gather each morning, let the message ring out clear and strong as the one important lesson—*Be Loyal Americans.*

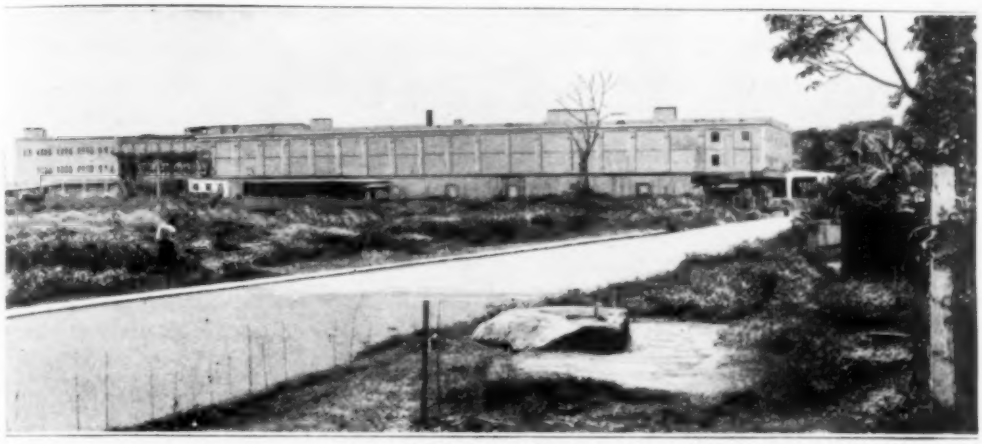
H. H. WINDSOR

STRANGE MORMON TEMPLE BUILT NEAR HONOLULU

Persons unfamiliar with the missionary activity of the "Church of Jesus Christ of Latter Day Saints" will be surprised to learn that a Hawaiian version of the Book of Mormon was produced in 1856. Now comes word that at Laie, across the island of Oahu from Honolulu, the Mormon Church has completed a stately house of worship. This is believed to be the only Mormon temple outside the con-



Many Dignitaries of the Mormon Church Participated in the Recent Dedication of This Edifice, at Laie, About 20 Miles North of Honolulu. The Structure is Said to Be the Only Mormon Temple outside the Continental United States



New Government Packing House in the Canal Zone: The Plant Not Only Serves as a Cold-Storage and Refrigerating Depot, but Bottles Milk, Cans Meat, Makes Ice and Ice Cream, and Converts Refuse into Valuable By-Products

tinental United States: it is at all events, remarkable for its bizarre, rectangular appearance. The recent dedication of the temple was attended by many church dignitaries.

ISLAND OF SOLID PHOSPHATE GOES TO BRITISH CONTROL

Five thousand acres of practically solid phosphate rock, rising out of the Pacific Ocean a few miles below the equator, has passed from German to British control as one of the spoils of war. Hereafter Nauru, or Pleasant Island, will divide its product between Great Britain, Australia, and New Zealand, to be used for their agricultural development. The allotments are to be readjusted every five years to meet the requirements of each country. Australia has the advantage of proximity to the island, and the availability of so plentiful a supply of fertilizer is expected to have marked effect on the extension of the continent's cultivated area.

CANAL ZONE FED FROM NEW CONCRETE PACKING HOUSE

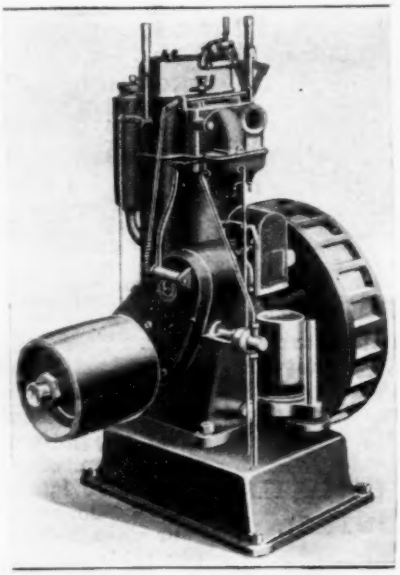
In accord with its policy of making the Canal Zone economically independent, the government has lately erected there a great packing house, that serves incidentally as a cold-storage, refrigerating, and milk-bottling depot, and as an ice and ice-cream factory. In conjunction with the slaughtering room is maintained a by-products establishment that finds uses for hair, blood, fat, bones, and hides. This unified service has already proved itself of immense value in expediting commissary service to passing ships, and to the local civilian, military, and naval population. The governmental appropriation of $1,500,000 was spent for three main buildings, each formed of reinforced-concrete columns, beams, and floor slabs, with walls of concrete blocks. The cold-storage rooms, with their capacity of 5,000 beef carcasses, have an additional lining of cork. As a whole, the plant is probably the largest and best equipped between the United States and Argentina.

SWITZERLAND LURES TOURISTS BY BIWEEKLY ALPINE FLIGHTS

While America's aviation program dies of monetary inanition, the little republic of Switzerland announces the increase of military and commercial activity in the air. Eight federal aviation stations have been established, and are now supplied with fighting planes of a new Swiss make. Of more interest to the touring public of America, however, is the news that three corporations are now maintaining regular air service to the fashionable mountain resorts. The inauguration of the service between Zurich and St. Moritz was mentioned in Popular Mechanics Magazine for June, 1919. Another air line takes the tourist from an airdrome in Samaden, western Switzerland, into the Bernina Mountains to the south. The third company offers biweekly flights around the famous Matterhorn, on the boundary between Switzerland and Italy.

USE FLYWHEEL AS RADIATOR FOR STATIONARY ENGINE

The most striking feature of an improved stationary gasoline engine, now being manufactured in Kansas, is the location of its radiator in the flywheel, which is specially designed for that purpose. By this means the cooling water is kept circulating through the cylinder jacket and radiator in a continuous cycle. Radiation is also assisted by a fan in the inner side of the flywheel. The intake and exhaust valves are large, and located in the detachable cylinder head. Lubrication is automatic, one engine-driven pump taking care of all oiling points. Another feature is a speed-regulating lever which slides on a graduated quadrant, giving a definite speed and power for each specific use of the motor. Its substantial and compact construction particularly fit it for farm or general outdoor work.



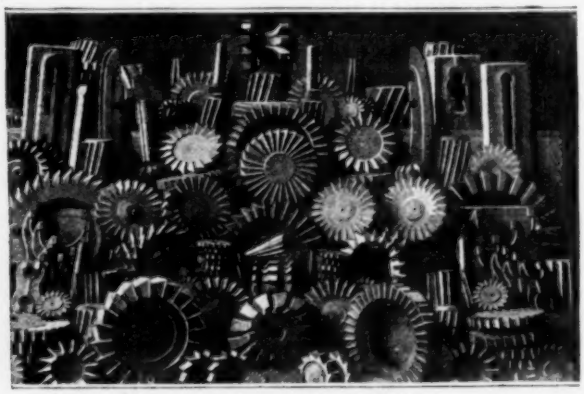
The Radiator of This Engine Is in the Flywheel, Seen at the Far Side

DESIGN OF WINDMILLS AIDED BY AIR-PROPELLER STUDY

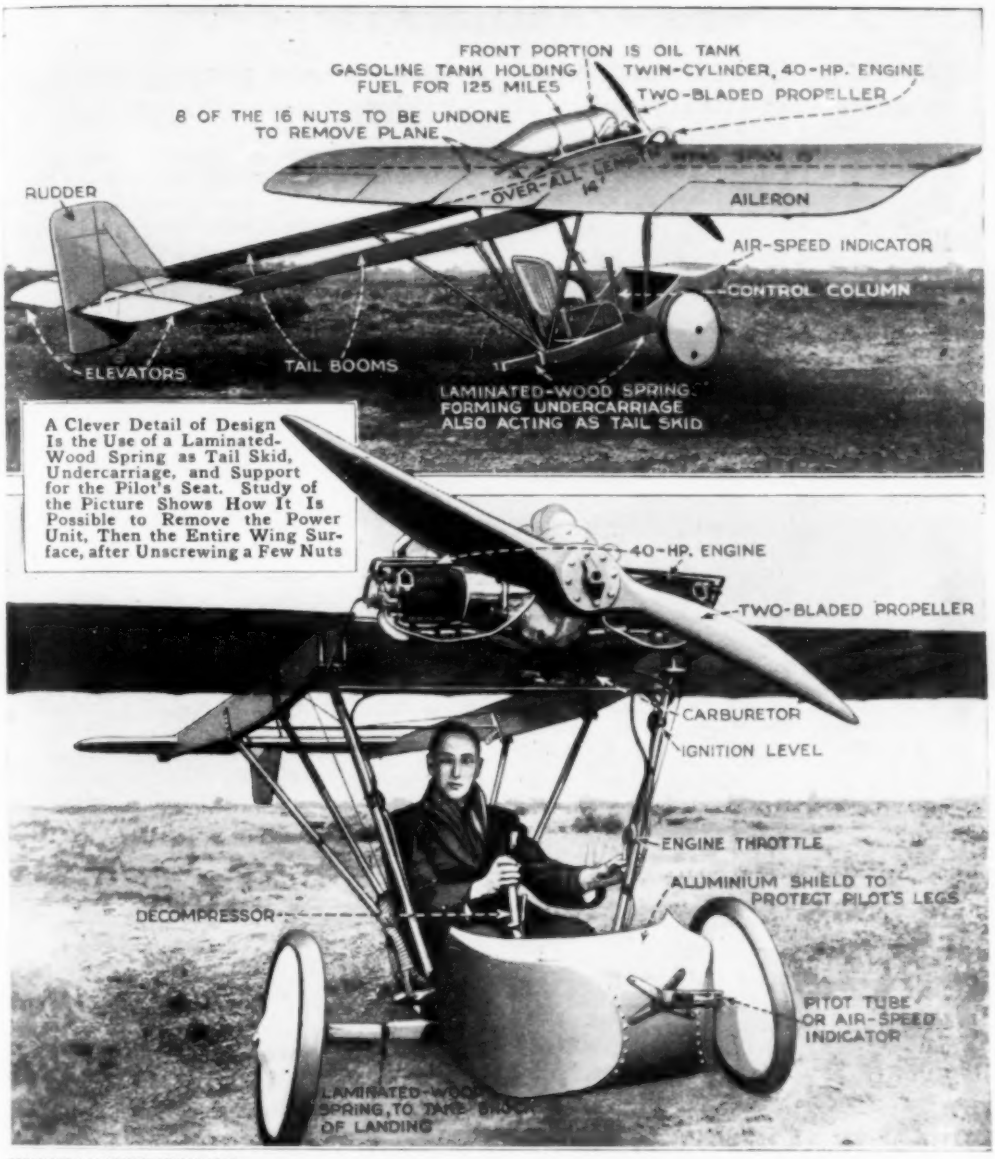
In its usual sense, the term "efficiency" is difficult to apply to the common windmill, because its duty is not to convert the greatest possible amount of wind power into mechanical power, but merely to deliver the greatest amount for its size, at a given wind velocity. Since the modern air propeller, however, is in effect an inversion of the windmill principle, the mill designer has a great deal to gain through study of the very highly developed theory of air screws. Small windmills of dynamic type already are used on air craft for driving generators and pumps, and one of these, 2 ft. in diameter, developed 2.1 hp. at 3,750 r.p.m., in a wind velocity of 90 miles an hour. Similar methods of design applied to the common stationary mill should produce as interesting results, to the advantage of the manufacturer as well as the user.

EDGED TOOLS OF NEW ALLOY ARE CAST TO SHAPE

Machine tools of many cutting edges, such as milling cutters, are simply cast, practically to their finished shape, instead of being laboriously ground from blanks, by the use of a remarkable steel alloy developed out of the war shortage of tungsten and vanadium. The tools are cast within 1/16 to 1/8 in. of size for finishing, saving a great deal of material and labor, and effectually disposing of the scrap question. The castings of the new alloy are as smooth as good forgings, do not scale or change shape in tempering, and produce thin cutting edges. As a substitute for high-speed steel in tools and dies, the performance records of the material show a surprising capacity for work, with little resulting wear on the cutting edges. It handles its work hot or cold with equal facility, and is unusually resistant to temperature changes.



Collection of Cutting Tools, Made of the New Steel Alloy, Cast to Shape, and Needing Only a Grinding Operation to Finish Them


FRONT PORTION IS OIL TANK
GASOLINE TANK HOLDING FUEL FOR 125 MILES
TWIN-CYLINDER, 40-HP. ENGINE
TWO-BLADED PROPELLER
8 OF THE 16 NUTS TO BE UNDONE TO REMOVE PLANE
RUDDER
OVER-ALL LENGTH 14'
AILERON
AIR-SPEED INDICATOR
CONTROL COLUMN
ELEVATORS
TAIL BOOMS
LAMINATED-WOOD SPRING FORMING UNDERCARRIAGE ALSO ACTING AS TAIL SKID
A Clever Detail of Design Is the Use of a Laminated-Wood Spring as Tail Skid, Undercarriage, and Support for the Pilot's Seat. Study of the Picture Shows How It Is Possible to Remove the Power Unit, Then the Entire Wing Surface, after Unscrewing a Few Nuts
40-HP. ENGINE
TWO-BLADED PROPELLER
CARBURETOR
IGNITION LEVEL
ENGINE THROTTLE
ALUMINIUM SHIELD TO PROTECT PILOT'S LEGS
DECOMPRESSOR
PITOT TUBE OR AIR-SPEED INDICATOR
LAMINATED-WOOD SPRING, TO TAKE SHOCK OF LANDING

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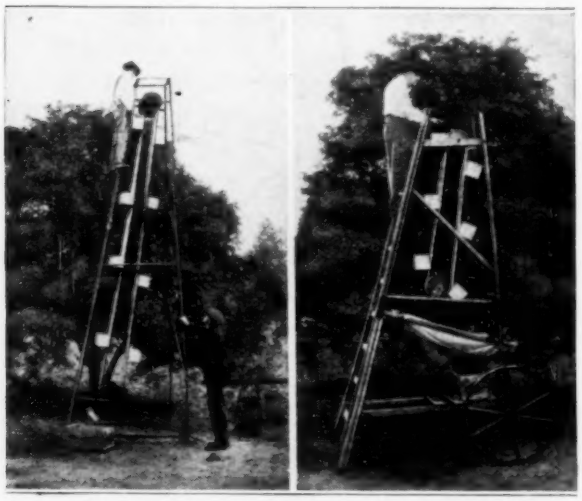
Dressed in Full Flying Equipment, the Average Airman Weighs Just About as Much as This Little Sporting Monoplane. This Lightness has been Achieved by Eliminating Every Unnecessary Feature, with the Exception, Perhaps, of the Aluminum Shield Which Protects the Pilot's Legs. The Machine should Land within 100 Feet, as Light Weight and Low Speed Make Landing Momentum Very Small

SMALLEST BRITISH AIRPLANE WEIGHS 220 POUNDS

Clearly inspired by Santos-Dumont's "Demoiselle" of 1907, is the "Crow," smallest airplane on the English market. In both monoplanes, the twin-cylinder engine is set on the leading edge of the single plane, only a few feet above the head of the pilot, who sits with his feet between the landing wheels. This new machine shows the modern tendency, however, in the elimination of every possible stay and wire. The entire lifting surface may, in fact, be removed after unscrewing a few nuts. The propeller, engine, and gasoline tank form a complete unit, which is detached with similar ease. The wing span in 15 ft., and the over-all length 14 ft. The speed is 65 miles an hour, which can be reduced to less than 30 for landing. The total weight is but 220 lb.; the price is expected to be $2,000, or less.

GRAVITY-OPERATED MACHINES ASSIST FRUIT PICKERS

By combining endless-belt conveyors with ladders, a western inventor has produced labor and timesaving contrivances for fruit pickers. One of these devices comprises a portable wooden frame, on one side of which is placed a ladder. The conveyor belt runs over pulleys near the top and bottom of the frame. Fruit dropped into the conveyor buckets is carried downward by gravity, and emptied into a canvas apron, from which it is diverted into a packing box. Another somewhat taller machine, made of steel, operates on the same principle, but dumps fruit directly into a box from the buckets, not being equipped with an apron.



Fruit is Lowered by Gravity, and Dumped into Packing Boxes by These Devices. The Machine on the Left Has a Steel Frame, While That on the Right is Constructed of Wood

HERO OF ATLANTIC FLIGHT DIES IN AIRPLANE CRASH

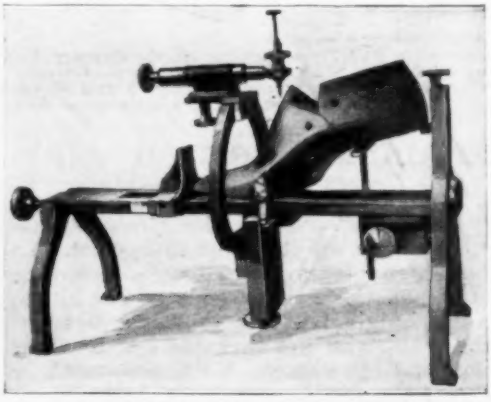
Capt. Sir John Alcock, hero of the first nonstop flight over the Atlantic Ocean, is dead. While flying on December 18, last year, near Cottevrard, in Normandy, France, his plane crashed to earth, inflicting injuries that next day proved fatal. Though Captain Alcock was but 28 years old at the time of his death, few men were older in point of flying experience. He had spent approximately 5,000 hours in the air, this total including many spectacular bombing raids over Turkish cities, in addition to the 16-hour flight which made his name a household word all over the world.

ODD CONTROL SYSTEM GOVERNS FLIGHT OF NEW HELICOPTER

Largely because of rumored support by the French government, the coming trials of a new French helicopter are being awaited with considerable interest. In general layout, the machine resembles a conventional monoplane, with fuselage and the usual tail surfaces. Each wing, however, is replaced by a four-bladed lifting screw, or more exactly, by four rotating wings of ordinary wood-and-fabric construction. The notable peculiarity of these radial wings is that their incidence may be altered, by controls in the pilot's cockpit, along any desired arc of their circular path. Thus each wing, as it passes a given point, may be tilted up, then down again. In this way the lifting power of each wing is increased or decreased to the right, to the left, to the front, or to the rear, giving the pilot both lateral and longitudinal control. Climbing, of course, is achieved by direct lift of the rotating wings, and horizontal flight is accomplished when the vertical axes are tilted forward, producing a horizontal thrust component.

GAUGE FOR LASTS ASSURES CORRECT FORM OF SHOE

Lasts on which shoes are made may be checked for accuracy within a thousandth of an inch by a new precision instrument designed by a Maine manufacturer. The micrometer adjustments



Gauge for Measuring Shoe Lasts, Accurate to the Thousandth of an Inch by Micrometer Adjustment

which test the exactness of each important point on the last may be set to the desired form and size and used as a permanent gauge for that particular style, or changed in a moment to fit other shapes. The machine also indicates the correct heel height for each last, holding it in the position of the shoe on the wearer's foot. For all its accuracy, it is quite simple.

STAND FOR PARLOR LAMP IS GOLDFISH AQUARIUM

For the occasional display of a few choice specimens, the goldfish fancier can find no aquarium more attractive than a recently invented combination lamp and bowl. In consequence of its double function, the glass bowl is cylindrical or vase-like in shape, its bottom resting on a stand of carved wood, while the top bears a similar support for the bulb and shade. From bottom to top of the bowl extends a glass tube through which is passed the necessary wires. The oriental aspect of the bowls and shades so far produced is explained by the fact that the inventor is a Japanese.

These Vaselike Supports for the Parlor Lamp are Intended for Use as Goldfish Aquariums. The Electric Wire is Threaded through a Glass Tube in the Center

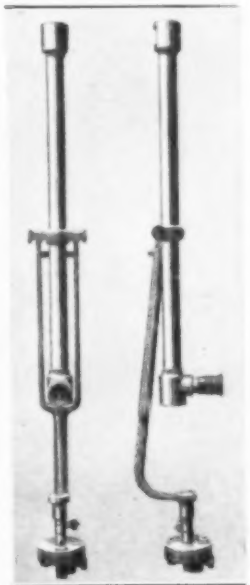
BODY OF NEW ROLLING CHAIR RESEMBLES CLOSED CAR

Equipped with an enameled sheet-metal body, which is similar to that of a closed automobile, a new rolling chair affords protection for passengers, regardless of weather conditions. The interior is upholstered, soft cushions being covered with imitation leather, and a ceiling light is provided. Other features are transparent curtains and glass windows, which can be adjusted in a few seconds, and a heating device. In spite of the fact that it is larger than an ordinary rolling chair, the novel contrivance is several pounds lighter, and should be easier to wheel.

Closed-Body Rolling Chair: This Vehicle is Provided with a Ceiling Light, Transparent Curtains, and a Heating Device

ANGLE-MEASURING PERISCOPE DIRECTS ARTILLERY FIRE

Ingenious and accurate fire-directing instruments shared with careful gun design and never-ending practice responsibility for the remarkable results of French and American artillery fire during the World War. One of the cleverest of these instruments, developed toward the end of the struggle, was named the "periscoptic goniometer." It is an ordinary goniometer, or angle measurer, fitted for use in the trenches by the addition of a periscope to the sighting arm. Masking the head with a few leaves, the artillery officer thus equipped could safely observe his fire from the most advanced of the first-line trenches.



BLOW-RESISTING PAPER CAPS DISPLAY GREAT STRENGTH

Astonishingly strong paper caps, capable of withstanding powerful blows,

Protective Paper Caps: Two Styles are Shown Above. At the Right, One of the Devices is Supporting Three Men

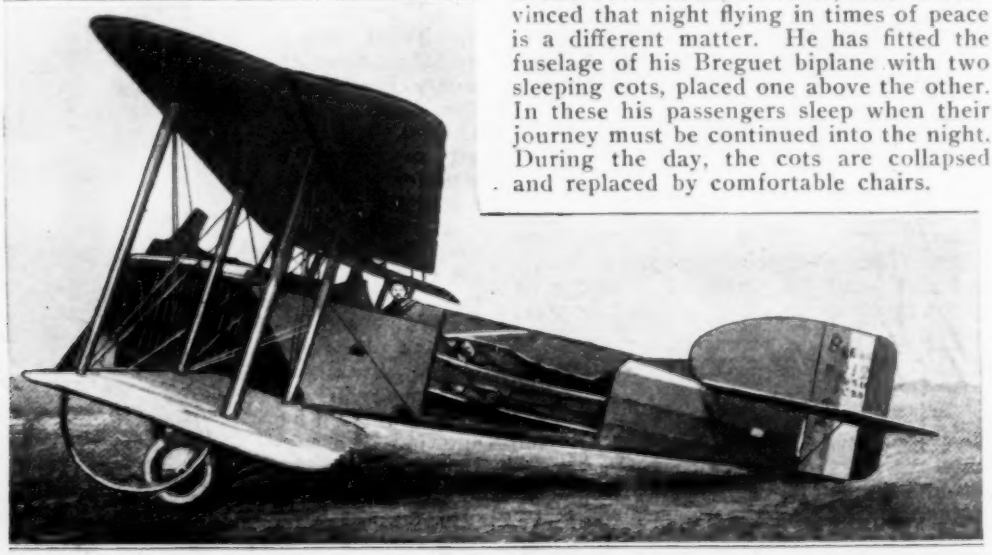
though extremely light in weight, have been invented by a shipyard employe, and are intended to be worn by workmen whose duties expose them to danger from falling objects. The process by which the novel headgear is produced has not been divulged, but it is known that chemicals are employed to harden the material, without adding to its weight. Several styles have been made, the lightest weighing about 7 oz., and others only slightly more. In a recent test, a 1-lb. bolt was dropped on one of them from a height of 40 ft., with the result that a barely perceptible dent was made in the paper. The novel head coverings are proof against water and acids, and are nonconductors of electricity.

ELECTRIC CLOCK CHIMES PLAY DIFFERENT TUNE EACH HOUR

Working during his spare time for six years, an electrician has completed an ingenious chiming attachment that can be installed in any clock of the hall, or "grandfather," variety. Like a player piano in theory, the attachment consists of eight hammers which strike small tone pipes as the perforated metal "roll" makes proper contacts. On the roll are 12 tunes, one of which is played for 30 seconds just before each hour is struck. If the music is not desired during the night, the attachment may be silenced by the turn of a switch. Both clockwork and attachment are run automatically by current taken through a simple transformer from an ordinary electric-lamp socket.

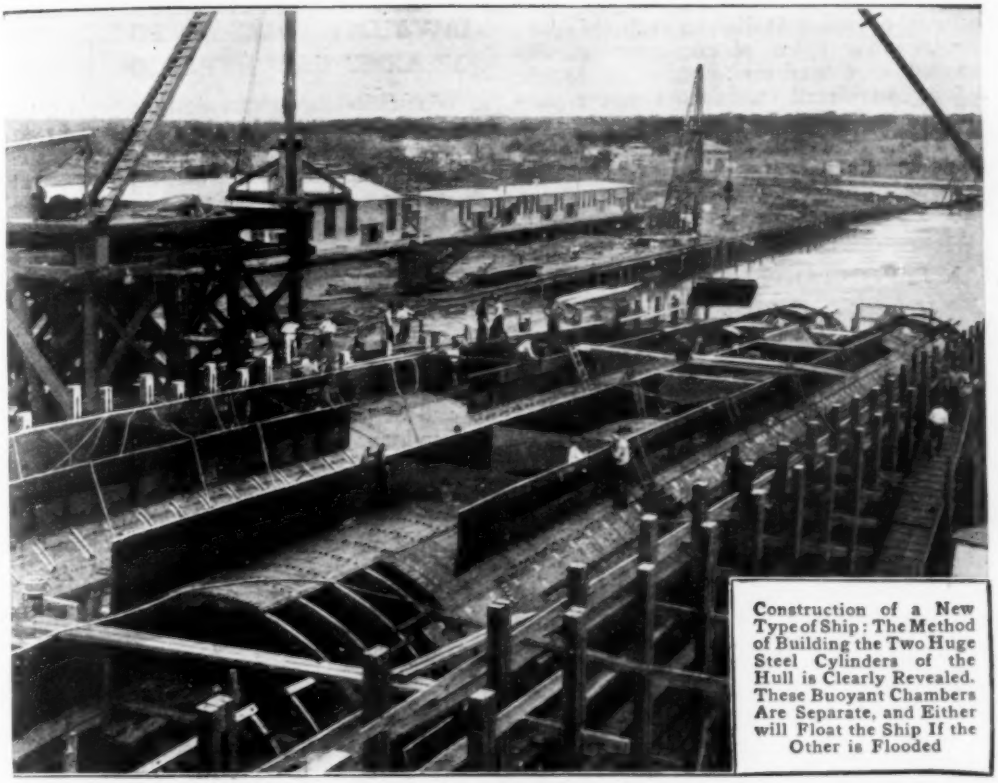
TOURING AIRPLANE HAS UPPER AND LOWER BERTHS

Night flying in war time is hazardous business. Ground lights are everywhere concealed; even the friendly airdrome is reluctant to announce itself by adequate display of flares and searchlights. There is one Frenchman, however, who is convinced that night flying in times of peace is a different matter. He has fitted the fuselage of his Breguet biplane with two sleeping cots, placed one above the other. In these his passengers sleep when their journey must be continued into the night. During the day, the cots are collapsed and replaced by comfortable chairs.



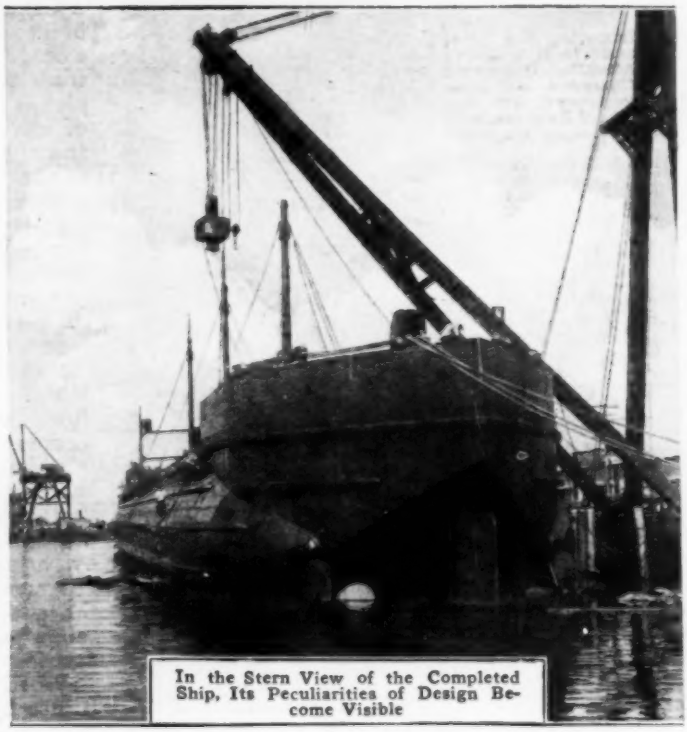
Fully as Comfortable as the First Sleeping-Car Berths, Are These, the First Airplane Sleeping Quarters. Constructed of Canvas and Steel Tubing, the Two Beds are Easily Collapsed and Replaced by Comfortable Chairs for Daytime Touring. For the Purpose of Illustration, the Side of the Fuselage has been Partly Removed; the Passengers are Entirely Inclosed during Actual Flight

FREIGHTERS BUILT ON TWIN-CYLINDER HULLS



Construction of a New Type of Ship: The Method of Building the Two Huge Steel Cylinders of the Hull is Clearly Revealed. These Buoyant Chambers Are Separate, and Either will Float the Ship If the Other is Flooded

Though not differing greatly in outward appearance from the conventional form of steel freighter, a new type of ship recently launched at New Orleans for the French government is really of most unusual construction, partaking somewhat of the catamaran character. The hull is built of two huge, air-tight cylinders, laid side by side and joined by the bottom and deck plates. The cylinders are 20 ft. in diameter, and they and the space between them, which is used to carry the fuel oil, are divided by cross bulkheads into eight compartments, making a total of 24 for the ship. The vessel's over-all length is 328 ft. 4 in., its beam, 46 ft. 5 in., and draft, 16 ft. 2 in. A triple-expansion 700-hp. engine



In the Stern View of the Completed Ship, Its Peculiarities of Design Become Visible

and its boiler is installed in each cylinder. The peculiar form of construction was adopted as a war measure. The double hull is considered unsinkable, and a perfect protection against torpedo attack, as the ship can proceed under half power with the other half out of commission, and one cylinder flooded. Five of these craft are being built.

DANGEROUS DUTIES PERFORMED BY MINE-SWEEPER CREWS

Countless mines still menace ocean shipping, in spite of the fact that the war ended months ago, and the task of removing these dangerous devices is providing hazardous employment for many men. A strong steel cable, strung through the water by a pair of mine sweepers, is used to gather the deadly contrivances. When a mine is caught, a swimmer, taking his life in his hands, leaves one of the boats, paddles to the explosive-filled shell, and removes the detonator, which serves to set off the charge when a vessel strikes the engine of destruction. By this risky operation, the mine is rendered practically harmless.

Removing the Detonator from a Mine: After This Hazardous Operation has been Performed, the Engine of Destruction Is No Longer Dangerous

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HAWAIIAN VOLCANO TO BE SITE OF ARMY RECUPERATION CAMP

When the American doughboy is consistently late for "mess formation" in an army post on the Hawaiian Islands, the commanding officer, without medical diagnosis, can name the cause. The soldier is suffering from tropical languor, an ailment akin to spring fever, but the result of too much ukelele playing and moon gazing on the beach at Waikiki. The old recuperation camp, maintained by the army for these cases, has for several years been unused. But another camp is to be established, and this time in one of the most picturesque and salubrious locations in the world. Haleakala, the extinct volcano that rises 10,000 ft. above the shores of Maui, has been chosen as the site. Breathing the frosty air of the summit, the "tropic-softened" soldiers will regain their wonted "pep."

FAMOUS BAY OF FUNDY TIDES BASIS OF NEW POWER PLAN

Where the estuaries of the Petitcodiac and Memramcook rivers meet at the head of Nova Scotia's Bay of Fundy, famous for its high tides, a Canadian engineer proposes to build a system of dams that would generate continuously from 90,000 to 200,000 hp. The plan is to dam the 4,900-ft. mouth of the Petitcodiac on the west, and the slightly narrower mouth of the Memramcook on the east, converting the former into a high-level, and the latter into a low-level basin. A wing dam would connect the junction of the two main dams to the point of land between, with the power house built on a diagonal from the west dam to the wing, leaving a three-cornered spillway. Inflow gates in the western, and outflow gates in the eastern dam, would automatically keep the two basins at high and low stage as the tides rose and fell. Gates in the spillway would be operated by attendants. With this arrangement, it is calculated that the effective head would always range between 13½ and 28½ ft., figuring on a 32-ft. tide. In the Bay of Fundy tides as high as 45 ft. are by no means uncommon.

SOUND AND LIGHT RUN CAR AND RING BELL

Starting, steering, and stopping a model auto by blowing an ordinary police whistle, an English scientist recently gave a striking demonstration of the possibilities of distant control of machinery. The little electrically driven car, with its manikin passengers, started forward at the first blast of sound. Another note from the whistle turned it around, and a third stopped it at its starting place. By blowing whistles of varying tone, a series of small electric lamps were selectively lighted. Control by light rays was illustrated by the ringing of a gong connected to light-sensitive cells, when the illumination of a hand lamp was thrown upon them, thereby reducing their electrical resistance.

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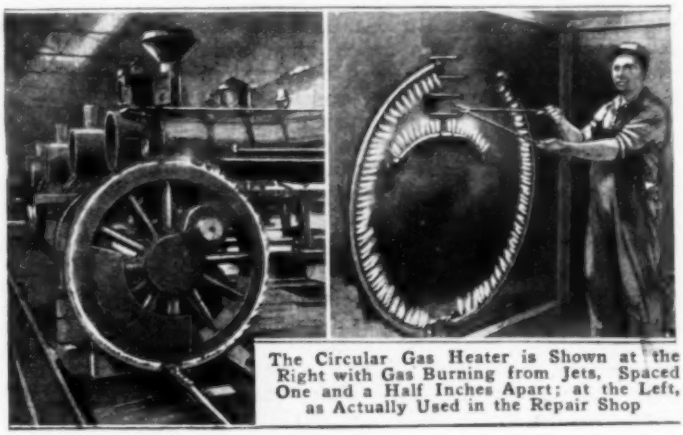
The Miniature Auto Controlled by Sound Waves Is at the Left. The Front-Wheel Drive and Trailing Rear Wheels Are Interesting. The Larger View Shows the Control of a Gong by Light Rays

BURNER REMOVES LOCOMOTIVE TIRES IN TEN MINUTES

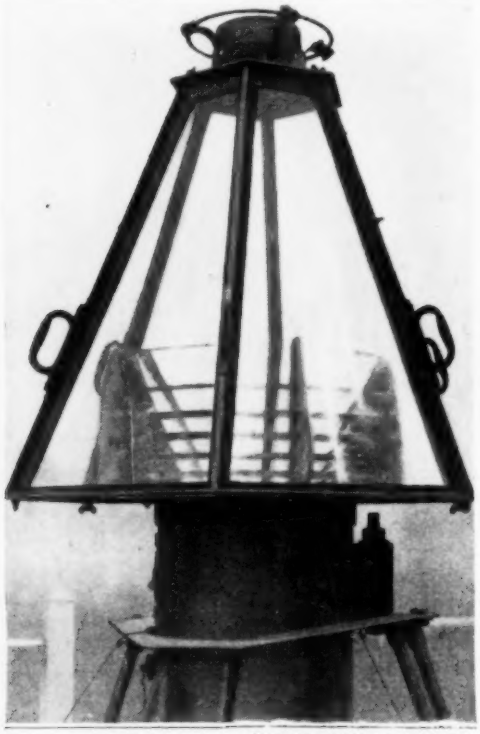
In the shops of a western railroad the steel tires of locomotive drivewheels are removed for repairs in 10 to 20 minutes. This is little longer than the time required by a good mechanic to remove the rubber tires of a motor truck. The remarkable speed is attributable to the use of a gas heating ring, which, clamped about the wheel, continuously bathes the tire in flame. Such uniform and powerful treatment rapidly expands the tire, and enables the workmen to slip it off. The burner itself is made in the form of two hinged, semicircular arcs, each of which is drilled at 1½-in. intervals. The supply pipe feeds a maximum of 1,000 cu. ft. of gas per hour through a tee near the hinge. The ring is easily carried to any part of the shop.



The Circular Gas Heater is Shown at the Right with Gas Burning from Jets, Spaced One and a Half Inches Apart; at the Left, as Actually Used in the Repair Shop

LIGHTHOUSE GUIDES AIRMEN BY VERTICAL BEAM

Lighthouses, or their equivalent, are just as necessary for the guidance of the airplane pilot as for the safety of the



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Placed on the Landing Field, This Portable Acetylene "Lighthouse" Sends Its Beam High into the Darkened Sky. Such Beacons Are Essential Adjuncts to Europe's Growing Air Commerce

sailor of the sea. The need of such aid to aerial navigation has been felt particularly in Europe, where so many companies are maintaining regular service between the larger cities. Various types have been evolved, but none more satisfactory than a beacon used on English landing fields. The light itself is set in a vertical cylinder of iron, which is placed on the ground, and covered by a glass cupola. Thus the intermittent beam is shot straight into the air, instead of horizontally as in the maritime lighthouse.

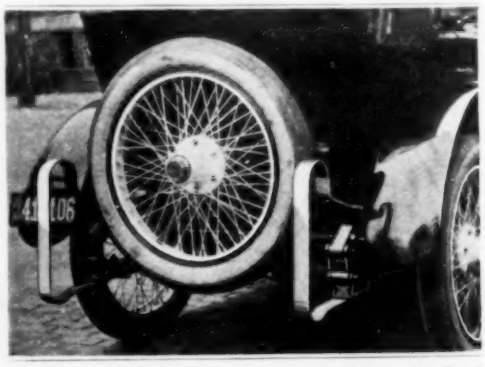
¶An American oil company suffered indirect but no less severe embarrassment in the Chinese students' boycott of Japanese goods, because it shipped its product from Port Arthur, Tex., which the Chinese took to be Japan's Port Arthur.

BLOCK ONE RIVER CHANNEL TO IMPROVE ANOTHER

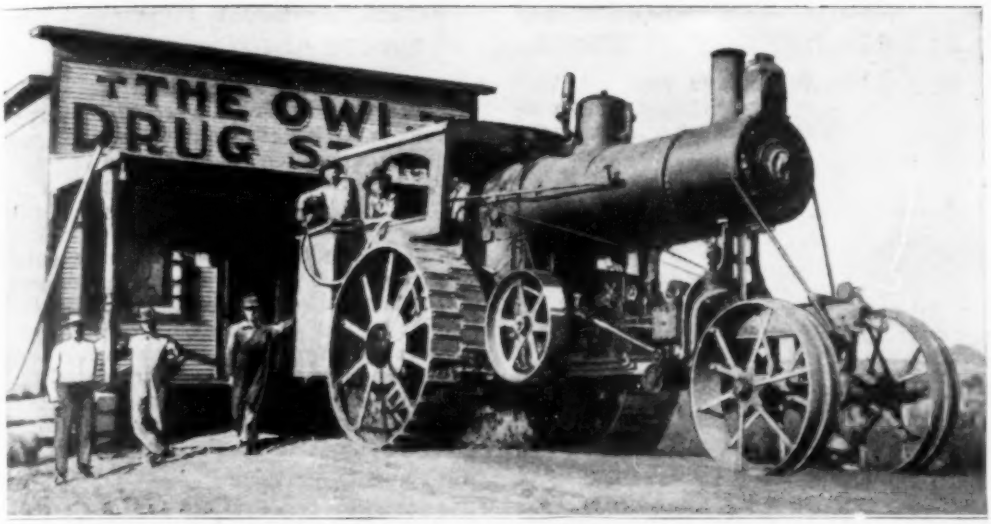
From Savannah, Ga., to the sea, some 12 miles, the Savannah River runs in two channels, and finds a third outlet through St. Augustine Creek, connecting just below the city. The north channel from this point to the mouth is deepened, by dredging, and by closing dams, to from 26 to 30 ft. Vast quantities of silt, however, are constantly depositing in the channel, and now the plan is to close the south channel by a rock-fill dam above St. Augustine Creek, cutting a cross connection to the creek by way of Habersham Creek. This will turn the flow wholly into the north channel, and scour it clear, but will reduce the access of tide water. A former government engineer therefore proposes a movable dam at the lower end of the south channel, admitting tide water, but allowing its escape only by passing downstream through the north channel with the natural current of the river, thus supplying additional water when it is most needed.

VERTICAL BUMPERS PROTECT REAR END OF AUTO

Rear-end collisions will not damage the motor car that is equipped with a new type of bumper, according to the inventor. The device consists of two U-shaped strips of spring steel, which are designed to be attached in vertical position to the back of an automobile, one on each side. There they are intended to engage the ordinary horizontal front bumper of another machine, and prevent it from coming in contact with the body or fenders of the car on which they are carried.



Vertical Spring-Steel Bumpers, Attached to the Back of an Automobile, Protect the Machine from Damage in Rear-End Collisions



Only One of the Strange and Impressive Fleet That Steamed across a Texas Prairie When the Town of Ochiltree was Moved by Tractors from Its Old and Isolated Position to a Brand New Site on the Railroad

WHOLE TOWN HAULED TO NEW SITE BY TRACTORS

By PAUL H. WOODRUFF

ASTONISHING spectacles are not dependent upon novel details for their surprise element: it is generally the effect of the whole that amazes. If a horseman crossing the trackless plains should see in the distance, for example, a collection of stores and dwellings of the usual type, he would merely assume that he had found a landmark. But if, when he looked again, the town had changed its place, and, furthermore, if the barber shop had usurped the position of the post-office, while a church was trying to overtake a slow-moving bungalow, the lone rider probably would be shocked. Then it would occur to him that the mirage was exceptionally good, or that the sun finally had "got him."

Houses have been moved on occasion ever since rollers and block and tackle were discovered. Tractors habitually haul enormous loads and get only brief applause; and not infrequently of late, they have been used to shift buildings about, as the pages of this magazine have testified. Yet when every building in a village of 300 inhabitants is hitched to a tractor and pulled across the prairie to a new site, astonishment is excusable. That is exactly what happened not long ago, however, down in the Texas "panhandle," where they are accustomed to doing things in a big way.

The little town of Ochiltree was disappointed in a lifelong ambition when a new railroad across its county passed it by, and went, instead, through a still smaller but rival settlement over to one side. It did not take long for an indignant committee of the whole to determine to emulate Mohammed, and take Ochiltree bodily to the railroad. And so, with the aid of all the tractors available, the town moved over and joined its sister community, thereby acquiring its coveted place on the railroad map.

MISSIONARY MOVIES TO SHOW HIDDEN LIFE OF FAR EAST

Phases of life in North Africa, China, India, and Burmah, ordinarily inaccessible to tourists, are to be registered on some 50 reels of movie film for the information of American church and theater-goers. Two separate expeditions, representing a powerful association of church workers, already have left for the scenes of the new effort, equipped to penetrate, by horse and camel, to the most remote districts of the eastern continents. Social and industrial conditions of the oriental hinterland are to be investigated as another function of the expeditions. The first pictures are expected to be available next March.

CONGREGATION DISAGREES, SO CHURCH HAS TWO BELFRIES

In a Kentucky village stands a little frame church, easily distinguishable by its odd twin belfries. Most edifices of this

The Duplication of Bell Towers on This Little Frame Church Is the Result of a Difference of Opinion. The Carpenter Built a Tower to Please Each Faction

size and type are ornamented with but one, and a single tower was the intention of the builders, in this case. But one part of the congregation insisted that the belfry was placed at the wrong side of the auditorium. A second faction stood firm for things as planned. A serious ecclesiastical entanglement was thus in sight, when the carpenter in charge decided to cut the Gordian knot. He built two belfries, one to satisfy each faction.

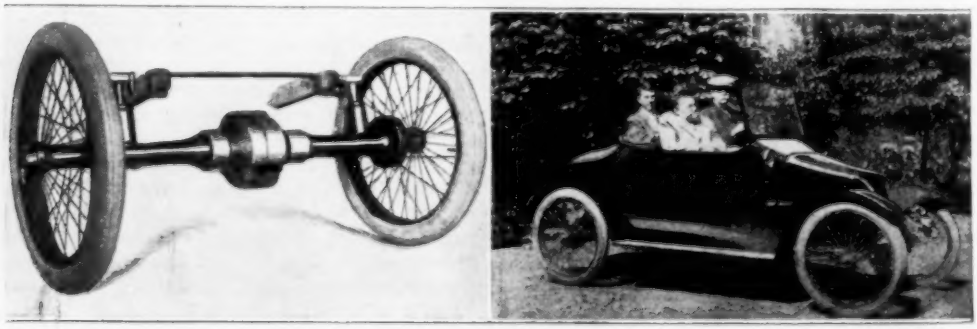
The pampered silkworms of Japan are to be offered an improved menu, with the aid of science. A noted American horticulturist has agreed to develop a better mulberry tree for their diet, at the request of a large silk producer in Japan.

NITRATE FROM EXPLOSIVES MAKES GOOD FERTILIZER

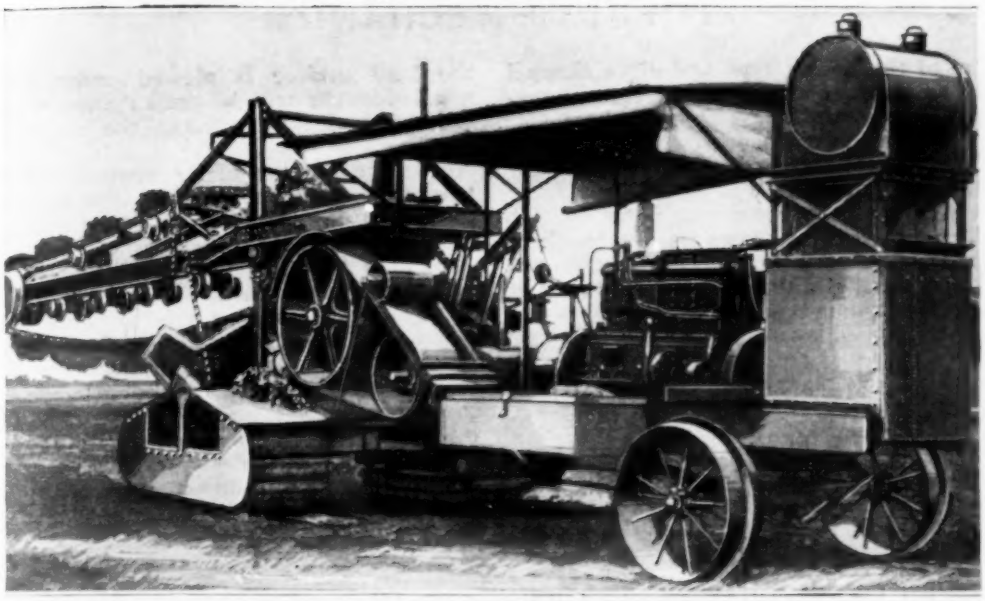
About the only agricultural use for explosives that is familiar to the average farmer is in blasting out stumps or cutting drainage ditches. An Italian scientist, however, has found that explosives containing nitrate of ammonia may readily be converted into high-grade fertilizer. The nitrate is dissolved out in a measured quantity of water in special containers. The saturated solution which results after standing for a time is decanted, and peat powder is added to it. Evaporation then yields a "nitrated peat" containing 42.8 per cent of nitrate. The fertilizing value of this substance is shown by tests to be nearly equal to that of sodium nitrate.

ELECTRIC AUTO OF NEW TYPE COMPETES WITH GAS CARS

One of the most interesting offerings in new autos this season is a small electric car which promises to match the popular gas-car models in first cost and radius of action, and completely to outdistance them in operating economy. Among the new car's novel features is the use of a small, light motor hung on the rear axle, its armature driving one wheel and its rotating field driving the other, thus entirely doing away with a differential gear. Reduction is by internal and external gears of almost equal size. Regenerative braking recharges the battery while coasting, and automatically slows the car on a down grade. A small charging set carried on the car makes it independent of service stations. The control is centered in a single pedal; the weight of the car is only about a thousand pounds.



The Simple Method by Which the Driving Motor is Suspended in the Rear Axle, Eliminating the Differential, is Seen at the Left. The Right View Gives an Idea of the Size and Appearance of the New Car, which Is Unusually Light and Economical



Type of Dredger Used to Dig the Channels in the Tract being Reclaimed near Salt Lake City: These Enormous Machines Cut a Quarter Mile of Trench Six Feet Deep and Two to Six Feet Wide Each Day. Two of Them Are in Service

DESERT TO BE SALT LAKE CITY MARKET GARDEN

By FREDERIC KINNEY

RECLAMATION of 7,250 acres of land lying between Salt Lake City and Great Salt Lake, and its conversion into a ranch capable of producing foodstuffs to supply the needs of the Utah capital, is now being vigorously prosecuted by private interests. Some dozen years ago the Federal government undertook to reclaim the tract and actually began work, but permitted it to lapse, and the acreage passed into the hands of the present owners at a nominal price. The project lay dormant until recently, however, when, exhaustive tests of the soil having proved the land capable of great fertility, the owners conceived the plan of establishing a great city-supply farm on the desolate and salt-incrusted tract.

Already $275,000 has been expended in the reclamation work, and engineers engaged on the project estimate that an additional $125,000 will be required to complete it. This work involves the construction of a system of small drainage canals crisscrossing the tract and emptying into two larger and central channels which convey the surplus salt water into Great Salt Lake. For unnumbered years the tract has been saturated with salt deposits, and the snows of winter and rains of summer have left the land a boggy waste, so far as the surface ground is concerned. At an average depth of three feet, however, there is a solid and exceedingly rich subsoil. To drain the surface of its water and upturn the soil is the task of the engineers.

Dredged Canal, Emptying into Great Salt Lake in the Distance: It Carries Off the Underground Water Accumulated by the Network of Tile Drains Installed in the Ground

The drainage canals will require approximately 66 miles of piping, which will be laid in gridiron fashion over the tract, and ordinary tile drainage is expected to relieve the clogged underground. Enormous dredging machinery is employed in digging the open canals. The dredgers

are of the bucket type and dig a channel of an average depth of six feet in surprisingly short time. Two of these machines are now at work on the project.

Before cultivation is possible, the sagebrush common to the Great Salt Lake region must be removed. This will be done by what is known as the "railing" process. Two ordinary railroad rails are placed parallel with each other and riveted together about two feet apart. They are then dragged over the surface, clipping the sagebrush close to the roots. The ground, previously freed from its surplus water by the drainage, is then ready for the plowman.

The first plowing will be 18 in. deep. The top soil, on which the alkali salts have gathered, will be turned under to the full depth of the plowing. When the land surface is plowed under, the alkali deposits will be drawn away with the water flowing through the network of tiling.

It is the purpose of the owners of the tract to devote the reclaimed land mainly to the raising of vegetables and fruits, for which a ready market is at hand in Salt Lake City, but live-stock breeding is also contemplated. The enterprise merely duplicates near a large center of population other successful reclamations of desert lands; but as the first attempt to convert the bleak territory between the Utah capital and Great Salt Lake into fertile fields, to create a city food-supply depot on the edge of a desert, it is of more than ordinary interest, and, perhaps, without counterpart anywhere on the globe.

FARM TRACTOR TURNS FERRIS WHEEL IN EMERGENCY

Looking strangely out of place, a mud-caked farm tractor recently chugged into the crowded carnival grounds of a town in rural Illinois. Uncouth as it was, it brought joy to the girls and boys, and incidentally to the carnival manager, who had all been disappointed by the motorless inactivity of the Ferris wheel, the show's most alluring attraction. The tractor was guided to a position near the driving pulley; the belt was stretched, and the big wheel soon turned once more. The machine played the rôle of merrymaker every bit as well as it had once pulled gangplows and helped thrash the grain.

The Versatility of the Farm Tractor was Demonstrated Once Again When This Machine was Substituted for the Disabled Engine of the Carnival's Ferris Wheel

NEARLY TWO HUNDRED SHOTS TO SINK CONCRETE SHIP

Fire attacked a cargo of coal in an American concrete ship lying at anchor in the harbor of Lisbon, Portugal, a few weeks ago, and in half an hour it had gained such headway that other shipping was endangered, and it became necessary to sink the vessel. At this seemingly simple task a Portuguese gunboat worked all night, firing the astonishing total of 189 shells into the 3,000-ton stone hull before it finally listed and went down in the deep water at the mouth of the Tagus River. The glow of the burning vessel, and the warship's desperate bombardment, made a spectacle that kept thousands of excited spectators in suspense for hours.

¶ Bank notes printed by an American company for circulation in Java are so attractively engraved that, on first appearance, they were hoarded by the Chinese and native population.

NEW MOUNTAIN ROAD NOW OPEN TO TRAFFIC

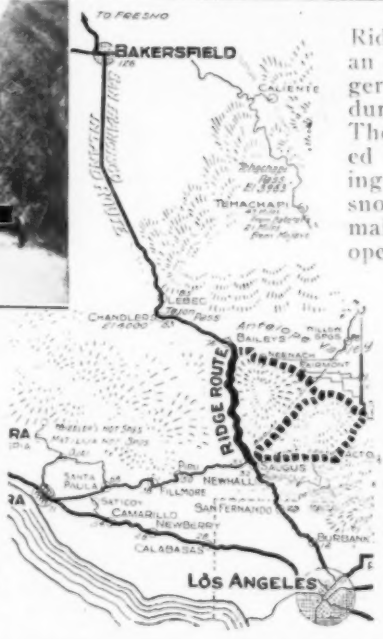
By JOHN EDWIN HOGG

THE Ridge Route over the La Liebre mountain range, conceded by road engineers to be one of the most remarkable pieces of highway ever built, has been completed and opened to traffic. This extraordinary piece of mountain highway is 30 miles in length, and will connect southern California with the San Joaquin Valley by the shortest and most direct route.

The Ridge Route is a marvel of highway construction in many ways. It reduces the touring distance between Pacific coast points 56 miles, and in spite of the fact that it goes over the lofty La Liebre range by the most direct route, it contains no gradient steeper than six per cent. The road is paved with concrete throughout its length, the surface being reinforced with steel bars, and the concrete layer being 4½ in. thick.

Through the High Mountain Passes, There Is Often Snow on the New Road, as Pictured Above. At the Left Is Visible the Heavy Concrete Curb That Protects Dangerous Turns

There Are Hundreds of Cuts like This through Solid Granite, Made to Keep the Grade Down



The Heavy Line of the New Route, and the Dotted Course of the Old Detours, Show the Saving Made

The construction of the Ridge road embodies details that make it the world's model of mountain highways. It is the first mountain road ever built looking exclusively to motor travel. Sharp curves have been eliminated as much as was possible, considering the mountainous nature of the country it traverses. What sharp turns there are are banked steeply on the outside to reduce the danger of skidding for motor vehicles. All dangerous turns are fitted with high concrete curbings, and the lesser turns are protected with heavy plank fencing. There are several points along the Ridge road that reach such an elevation as to be in danger of being closed by snow during a portion of the year. These stretches are protected by snow fences, and during the winter months a snowplow service will be maintained to keep the road open at all times.

The road traverses a country that is of wonderful scenic beauty, with the concrete pavement extending through the mountains for a distance of 30 miles. From the ends of the mountain pavement highways of asphalt connect with Los Angeles and San Francisco.

No other highway yet attempted approaches the Ridge Route for sheer audacity of engineering conception. The road, often contemplated, was considered impossible of achievement until 1912, when the preliminary survey was made. Grading was begun in 1914,

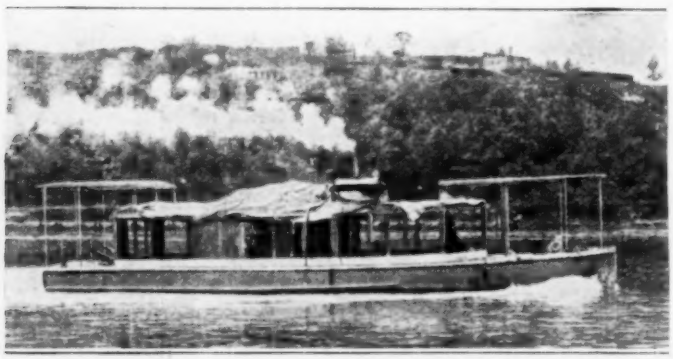
and the completion of the highway necessitated the removal of 1,000,000 cu. yd. of rock and earth. To construct the 30 miles of pavement, which is 20 ft. in width, water had to be supplied by means of an aqueduct 35 miles in length (there being no local supplies of water sufficient for the task in the entire 30 mountainous miles). The water problem, in the mixing of the concrete, necessitated constructing several concrete reservoirs at convenient points along the route. The total cost of the 30-mile mountain road was $1,150,000, but since the highway will carry approximately 1,000 machines a day, its original cost will soon be returned to the state. The reduction in distance alone will effect a saving of approximately $6,000 a day in motor fuel, and the touring time between north and south Pacific-coast points will be reduced by fully three hours.

Engineering Skill of High Order was Needed to Build the Road among the Mountain Peaks

Sharp Curves of the New Road are Banked 15 Degrees, like a Race Track, to Reduce the Danger of Skidding to a Minimum

SHALLOW-DRAFT MOTORBOAT TO EXPLORE RIVER

Foiled in several attempts to explore the Rio Negro, a tributary of the Amazon River, because of the numerous rapids, sand bars, and shallow stretches that make navigation of the stream difficult, a professional man of Boston has sent to Brazil a motorboat designed to surmount these obstacles. Though the craft is 45 ft. long and has a beam of 14 ft., it draws only 2 ft. of water. The propeller and rudder are placed in a tunnel at the stern, so that they do not extend below the keel. Power is furnished by a 30-hp. kerosene engine, supplied with fuel by tanks holding 1,200 gal., on which quantity of oil the vessel can travel 1,800 miles at a speed of eight miles an hour. Screens and awnings are provided for protection against insects and the sun's rays. A compact kitchen and sleeping quarters are other features.



Motorboat Built for Exploring a South American River: Because of Its Shallow Draft, the Vessel will Not be Impeded by Rapids and Sand Bars

AMERICAN SOLDIER PACIFIES WAR-RIDDEN CAUCASUS

In that strange region where the head of Asia Minor rests against the continent of Europe, between the Black and Caspian seas, a bitter religious war has waged unceasingly for nearly 2,000 years. Here the Turkoman Mongols of Azerbaijan, in northern Persia, Mohammedans of the fanatic type, strive constantly to overcome and exterminate the Christian Armenians. Out of this seething caldron of oriental hatred, an American army officer, acting as allied high commissioner in the Caucasus, has brought the first peace of its history. A treaty has been signed by the premiers of Azerbaijan and Armenia, and the American becomes personal arbiter of state disagreements.

LITTLE SAFETY RAZOR HELD BY THUMB AND FOREFINGER

The traveling man will be interested in a new safety razor, which, being little larger than the blade it holds, can be carried conveniently in the vest pocket. Any blade, single or double-edged, heavy or light, may be used, as it is simply clamped into place. To use the little razor, the shaver grasps the hinged grips between thumb and forefinger. Holding it in this way, he is able to ply it with confidence

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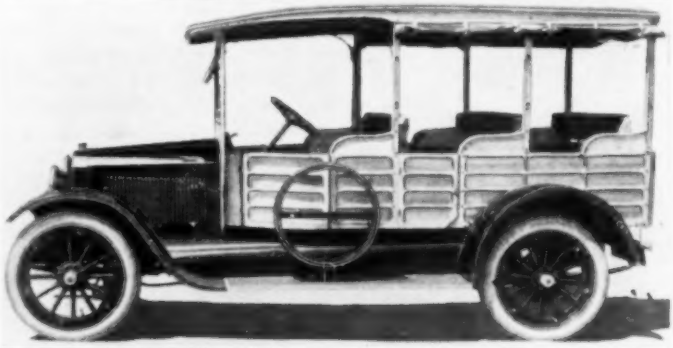
The Little Safety Razor Above will Hold Any Blade. Gripped between the Thumb and Forefinger, It is Applied to the Face as at the Left

in a crowded, lurching Pullman washroom. As there are no unattached parts, except for the blades, the razor is always ready for duty.

ROOMY "COUNTRY-HOUSE" CAR LIKE OLD-TIME CARRYALL

The modern auto of graceful curves never has wholly lent itself to the multifarious duties of the old-fashioned carryall. The general-utility vehicle used for runs into town from a country estate must carry guests, luggage, and all the purchases that are made on the trip. An eastern dealer has fitted to a moderate-priced chassis a new type of body that meets all these requirements. The natural-wood panel sides carry three cross seats, accommodating eight persons, and a high tailboard on chains admits a surprising amount of baggage to the open space under the seats.



Reminiscent of the Old Carryall, This Modern Country-House Car Accommodates a Load of Freight and Baggage besides Its Eight Passengers

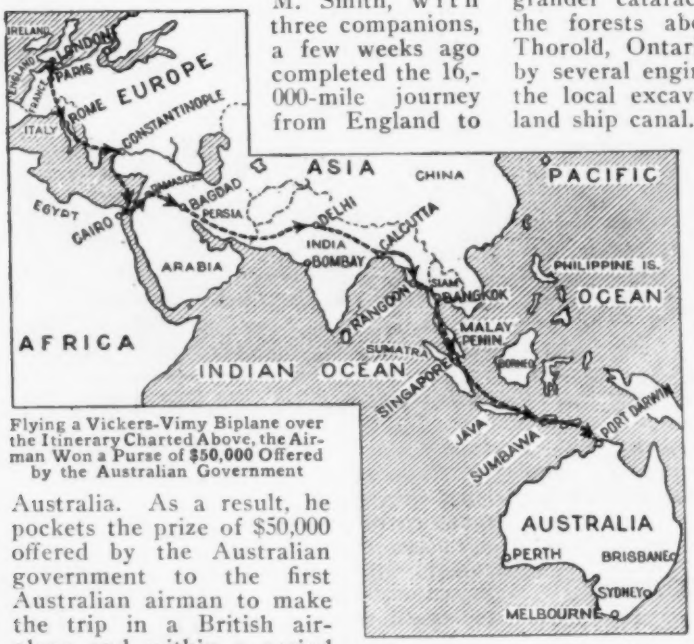
ARKANSAS OFFERS SETTLERS HALF MILLION ACRES

Arkansas is offering exceptional opportunity to homesteaders just now. A total of 520,000 acres of land is open for settlement, 300,000 acres of it government holdings and the other 220,000 land that has been forfeited to the state for taxes. The state land is available, by filing, to any American head of a family, 21 years or more old. Van Buren County, in the central part, leads the government holdings with 47,480 acres, and Washington County, in the northwest, tops the state list with 40,960 acres.

¶An electric light and power enterprise at Osaka, Japan, will have the largest steam-power electric installation in the Far East with the completion of a plant now being erected. It will have two 25,000-kw. turbine units of American make.

REPLICA OF ALCOCK'S BIPLANE WINS RACE TO AUSTRALIA

Flying a Vickers biplane almost identical with the transatlantic machine, Capt. Ross M. Smith, with three companions, a few weeks ago completed the 16,000-mile journey from England to Australia. As a result, he pockets the prize of $50,000 offered by the Australian government to the first Australian airman to make the trip in a British airplane and within a period of 30 days. The winner left Hounslow, England, under the happiest omen, his big plane being put through its final test by Sir John Alcock, first to cross the Atlantic in a nonstop flight. From Hounslow, Captain Smith flew to Paris, then to Rome, Saloniki, Cairo, Damascus, Bagdad, Bushire, Bandar Abbas, Karashi, Delhi, Allahabad, Rangoon, Bangkok, Singapore, and finally to Port Darwin on the northern tip of Australia.



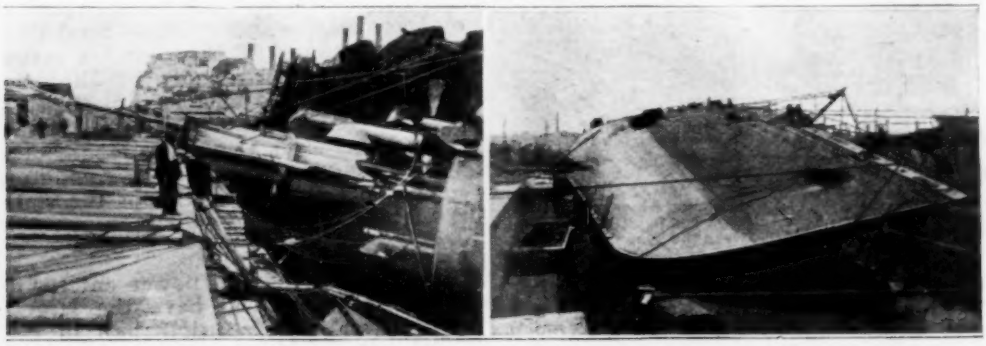
Flying a Vickers-Vimy Biplane over the Itinerary Charted Above, the Airman Won a Purse of $50,000 Offered by the Australian Government

ANCIENT FALLS OF NIAGARA FOUND BY CANAL DIGGERS

Niagara Falls, nature's American masterpiece, is merely the successor to a grander cataract that, eons ago, shook the forests about the present site of Thorold, Ontario. This opinion is held by several engineers who have inspected the local excavations for the new Welland ship canal. Here, 10 miles south of Lake Ontario and the same distance west of the present waterfall, precipitous ledges have been uncovered, over which water from Lake Erie is thought to have poured in seeking the lower level. In support of this theory is adduced the remarkable evidence of the rocks themselves, these bearing unmistakable signs of erosion through countless years. As a matter of fact, it has long been surmised by scientists that the discharge from Lake Erie followed other routes during two distinct glacial epochs, diverting water from Niagara until it drained only one-eighth of its present territory.

STEAMER TURNS ON ITS SIDE WHEN DRY DOCK IS FLOODED

An accident of unusual character interrupted a course of ordinary repair work on the French steamer "Dumbea" a short time ago, costing the lives of two men and doing considerable damage to prop-



French Steamer "Dumbea," Capsized in Dry Dock: The End of the Mast in the Left View Crushed the Roof of a Shed on Shore, and Came to Rest on the Dock Wall. The Ship went Clear Over on Its Beam Ends, as the Right View Indicates

erty. The packet boat had been in dry dock at Marseilles, France, for some six weeks, and the space was needed for other work, so water was admitted to the dock, with the purpose of completing the repairs afloat. As the vessel lifted, it was observed to list badly to port, and before any ballast could be shifted, all the loose contents of hold and deck rushed to the depressed side, and the ship went over on its beam ends. The gangplanks were crushed, and the smokestacks and masts crashed down upon the dock wall, one mast smashing the roof of an empty shop. Only one of the 350 men on deck was lost, the other casualty occurring in the engine room.

CONCRETE MULE BARN ERECTED BY COAL-MINING COMPANY

Comfortable quarters for the mules employed in a Kentucky coal mine are provided by an unusual barn, recently built by the operating company. Every part of the structure, including the stalls, the feed troughs, and a drinking fountain, is made of concrete. The building is ventilated by pipes on the roof, and iron-

A Steam-Heated Stable, Entirely of Concrete, Shelters the Mules Working in a Kentucky Coal Mine

barred windows along both sides. In cold weather, the stable is heated by steam pipes, leading from the pumping station, located not far away.

LATEST ENGLISH "SCOOTER" HAS THREE WHEELS

The popularity of the "scooter" explains the production of the tricycle scooter, England's latest automotive novelty. As with the conventional two-wheeled species, steering is effected by the front wheel; the car is unusual, however, in mounting the motor and transmission between the two rear wheels. Riding is consequently less acrobatic and a good deal more comfortable. The little one-cylinder engine produces 1¼ hp., consumes a gallon of gasoline for every 150

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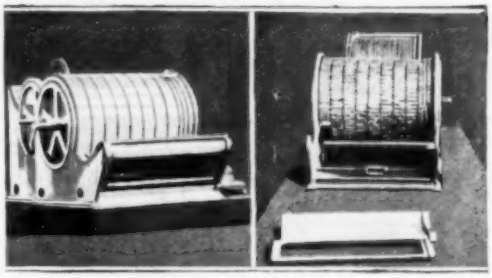
This "Scooter" Is Easier to Ride Than the Two-Wheeled Variety, So Is More Popular with Women. It Created Evident Interest on This First Appearance in London

miles traveled, and gives a touring speed of 12 miles an hour.

MACHINE PRINTS ALL ITEMS ON CHECK BUT SIGNATURE

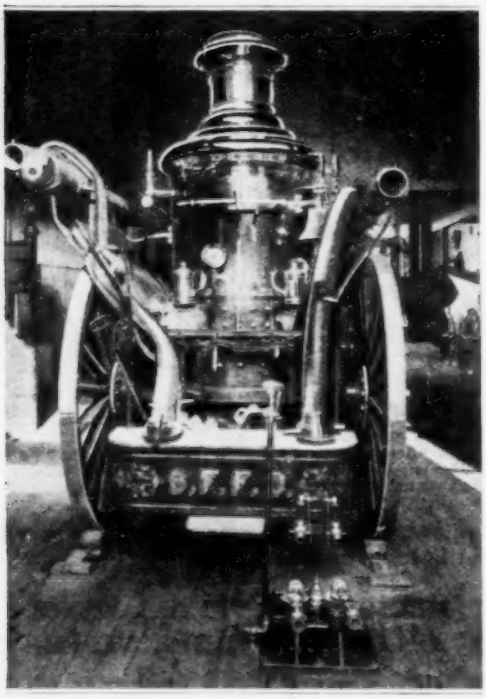
Most check-writing machines print only the amount; a new machine prints everything but the signature. Operation is by means of four levers, which control two type cylinders. One cylinder prints dates, names, and the amount in words; the other supplies the numerals. Alteration of a check made out with this machine is practically impossible, as the type macerates the paper fiber in a peculiar way, besides impregnating it with acid-proof ink. The machine will print any amount to within one cent of a million.



Above is Pictured, from Two Viewpoints, the Machine That Prints Every Item on a Check but the Signature. One Cylinder Prints Letters; the Other, Numerals

GAS-BURNING HEATING DEVICE FOR FIRE-ENGINE BOILERS

Pressure must be maintained constantly in fire-engine boilers, to keep the machines ready for instant use. Generally,



A Fire Engine, Equipped with a Gas-Burning Heater, Which Keeps Pressure in the Boiler at All Times

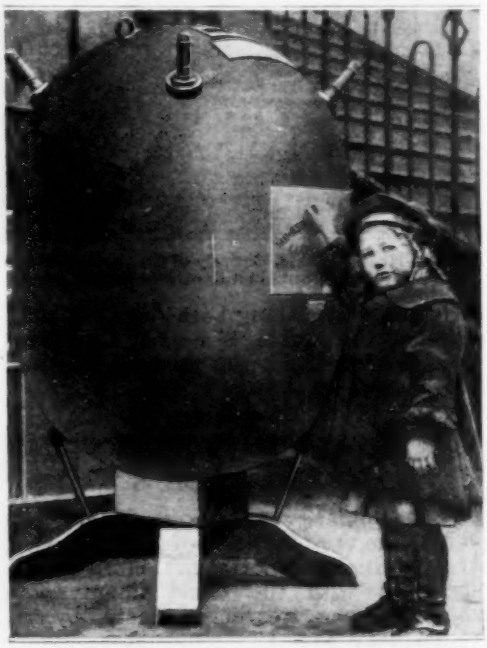
this result is obtained with coal-burning heaters, installed in the basement of the fire stations. As these heaters are expensive to operate, and inconvenient, the city officials of San Francisco have adopted a device which utilizes gas as fuel, and which is declared to be both economical and labor-saving. The apparatus comprises a movable pipe, to which is attached a burner that can be placed in the fire box of an engine, and removed, when an alarm is sounded, in a few seconds. An automatic regulator controls the flow of gas.

SHIPS TAKE UNUSUAL FREIGHT TO FAR EASTERN LANDS

Some strange cargoes have been shipped to oriental countries from America. Not long ago, a vessel sailed from a seaport on the western coast of the United States, loaded with barber poles, which were destined for Hongkong, China. These striped signs have become quite popular in the Far East, and many Chinese barber shops employ them as advertisements, though the tools and methods of the trade in that land are still very primitive. Another unusual consignment consisted of the equipment of a brewery, which was dismantled recently at Vancouver, B. C. The machinery was sent to Japan, where it will be assembled and used for manufacturing beer.

HUN MINE STANDS IN ENGLISH STATION AS COLLECTION BOX

Removed from the North Sea by British mine sweepers, an ugly German mine now stands in a London railway station as a collection box for the relief of mine sweepers' dependents. A brass plate tells the thousands who pass by daily that it is there to receive contributions of books and magazines, or of money. The former are slipped through an opening in the top of the mine, the latter through a slot in the side. The strange receptacle pleads a worthy cause, as the hazards of sweeping mines from the infested waters of the North Sea were little diminished by the signing of the armistice.



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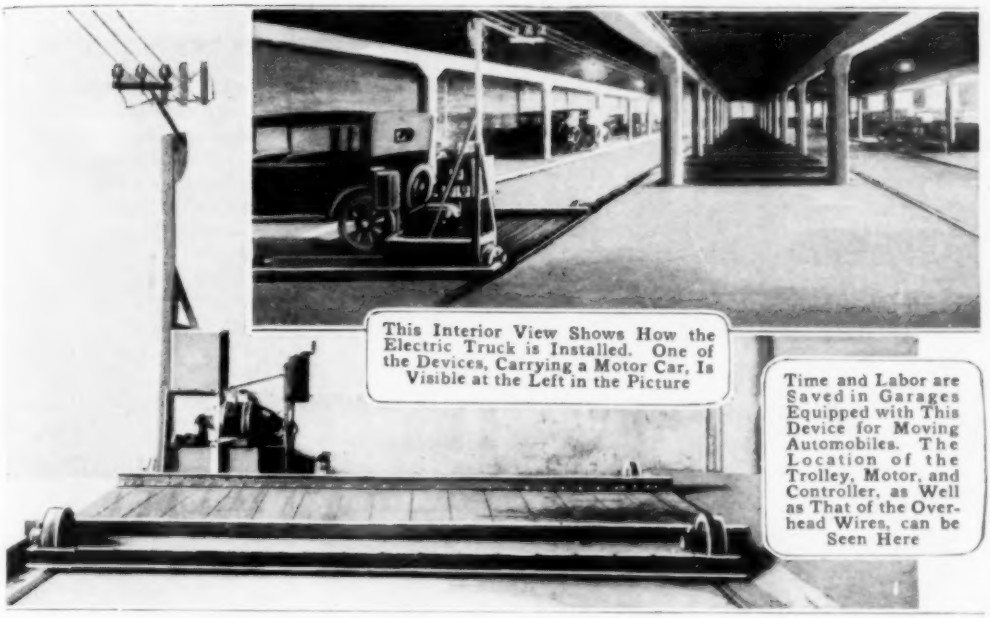
Intended by the Germans for a Destroyer of Allied Life and Property, This North Sea Mine Now Collects Books, Magazines, and Money for the Dependents of British Mine Sweepers



This Interior View Shows How the Electric Truck is Installed. One of the Devices, Carrying a Motor Car, Is Visible at the Left in the Picture

Time and Labor are Saved in Garages Equipped with This Device for Moving Automobiles. The Location of the Trolley, Motor, and Controller, as Well as That of the Overhead Wires, can be Seen Here

ELECTRIC TRUCK MOVES CARS IN MODERN GARAGE

To place automobiles in their proper storage positions, an eastern garage employs a novel electric truck, which does away with the tedious maneuvering ordinarily necessary to accomplish this result. The device is a platform, 8 ft. wide and 15 ft. long, mounted on four flanged wheels, and equipped with a 7½-hp. motor. Current for the latter is obtained from overhead wires through a trolley. Tracks are placed in a depression which extends the length of the building. By this arrangement, the platform and the floor at either side of the trackway are brought to the same level. A car is driven onto the truck, moved to the location reserved for it, and then run into its space.

CANADA TO HAVE ITS OWN LINCOLN HIGHWAY

Encouraged by the success of our Lincoln Highway Association in binding East and West by a great national pike, the public-spirited Canadians are agitating for a similar project in Canada. Present plans call for the organization of an association pledged to construct a transcontinental road from Halifax to Vancouver. Already committees have been formed in Toronto and Ottawa, and branches are growing in other provinces.

PICTURES ADVERTISE STOCKS OF RUSSIAN STORES

Illiteracy is so general in Russia that, as a consequence, goods are advertised by means of pictures, which provide a language that can be understood even by the most ignorant. In the poorer sections of the larger cities, such bids for trade are common sights. A store in Archangel that sells kitchenware, tools,

Hardware Store in Archangel, Russia: The Pictures Inform Illiterate Persons That Kitchenware, Tools, and Farming Implements are Sold Inside

and farming implements has crude pictorial representations of these articles painted on the front of the building.

MAN ASSEMBLES SKELETONS FOR THIRD OF CENTURY

There is a man employed by a medical college of the Middle West, who for the last 30 years has been sorting human bones, and assembling skeletons. The assembling job, alone, is a difficult one, as every big and little bone must be bored and wired to its proper neighbors. But that performance is only the end of this man's task; for the bones come to him from the pickling vats, in which the flesh remnants are removed, quite loose and mixed, often in lots of three and four skeletons. With his 30 years' experience, however, the artisan finds it easy to restore the bones to their original combinations. He markets the larger part of his handiwork with art and medical schools, although he often sells to individuals interested in anatomy.

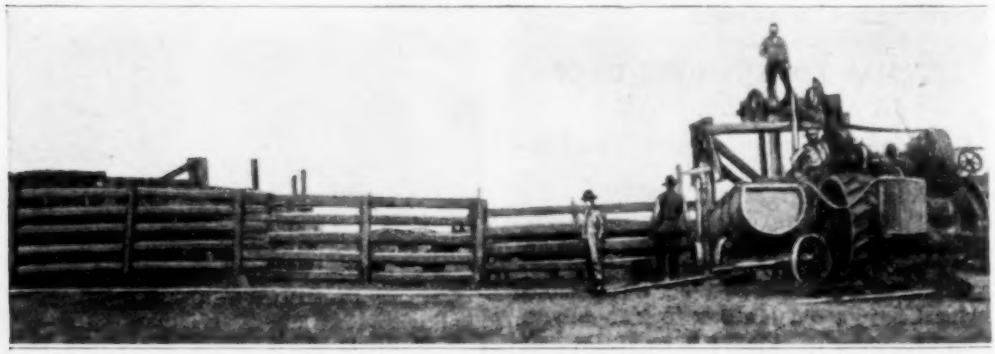
From the School's Dissecting Room, the Cadavers Go to the Pickling Vats, Where They are Stripped of Flesh. The Jumbled Load of Bones Then Goes to This Workman, Who Assembles Them

DOG CARRIES LINE TO SHORE FROM SHIPWRECKED VESSEL

Ninety-two lives were saved by an intelligent dog which swam ashore from a shipwrecked steamer on the coast of Newfoundland recently, carrying a life line through breakers that would have destroyed a boat or killed a human swimmer. An attempt had been made to shoot a small rope across the rough water, but this failed when the line caught on a rock, and fell short of the target. Officers of the stranded vessel then put the canine overboard. After a desperate struggle, the animal succeeded in releasing the rope, and with the end of this grasped firmly between its teeth, finally reached the beach. It was then easy for the crew, assisted by fishermen on shore, to improvise a device for rescuing themselves and the passengers on board from their perilous position.

VETERINARIANS USE TRACTOR IN ANIMAL THERAPEUTICS

An epidemic of mange, which attacked a large herd of cattle on a ranch in western Canada last summer, spread so rapidly that heroic treatment became necessary. With the aid of government veterinarians, a timber cage, 10 by 10 by 3 ft., was erected over a vat full of sulphur and lime solution, kept at a temperature of 110° F. On top of the cage a hoist was

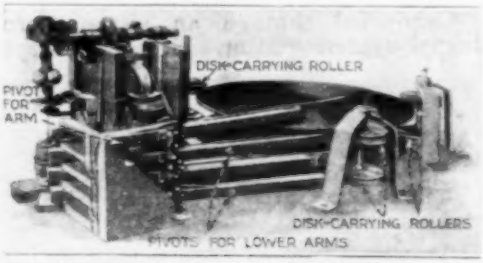


Treating Cattle for Mange with the Aid of a Tractor: The Cattle are Led to a Vat beneath the Cage at the Right, and Dipped in the Curative Solution by a Hoist on Top, Operated by the Tractor's Power Pulley

installed, driven by belt from the power pulley of a large tractor. With this equipment the afflicted cattle were dipped in the vat and hoisted out again at the rate of 200 an hour.

AUTOMATIC PHONOGRAPH PLAYS ONE RECORD AFTER ANOTHER

Persons who wish the phonograph would just keep on playing can have their wish now, with the aid of a machine devised by an Illinois inventor. The several disk records to be played are supported one above the other by sets of rollers, three of which hold the edge of each disk, leaving space enough between them for the insertion of arms, carrying needles which engage both upper and lower faces of the records. The outer ends of these arms transfer the vibrations to the single reproducer. The operation is automatically shifted from the end of one selection to the beginning of the next. The phonograph needs no attention after it is started, and when the end of the last record is reached, it stops of its own accord.



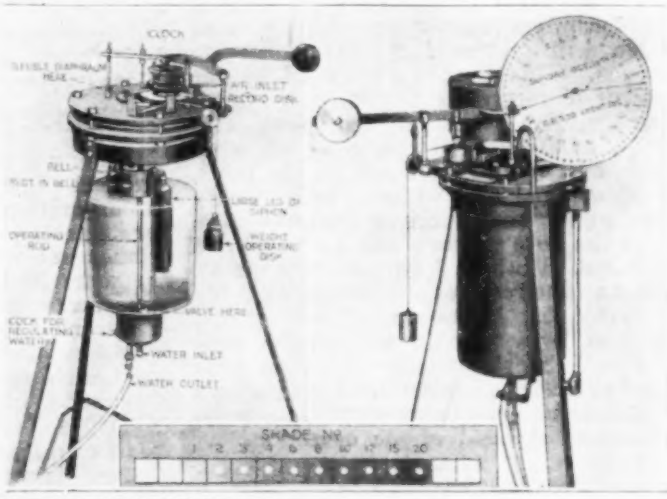
The Arrangement of the Record Disks in the Automatic Phonograph, with Needle Bars between Them

America's first aerial coast patrol was inaugurated a few days ago when two army planes flew from New York to Virginia and back, reporting at the finish on all shipping observed.

SIPHON CONTROLS INGENIOUS FOG FILTER AND RECORDER

English meteorologists are now analyzing the famous fogs of London with an automatic atmospheric filter of remarkable ingenuity. The instrument consists, in the main, of an air-tight cylindrical vessel, in which water is made to rise and fall between two fixed levels by means of a simple siphon action. The top of the vessel is pierced by a single air inlet, ⅛ in. in diameter, past which moves the circumference of a white blotting-paper disk. This disk is divided into 24 hour periods, and is revolved by a weight and string which cause it to follow a clock, except when clamped to the inlet to receive a record.

A record is made each time the water level is lowered by the siphon, as this action sucks 122 cu. in. of air through the blotting paper, and thus registers the filtered impurity of the air as a gray or black dot, ⅛ in. in diameter. As the water inlet at the bottom of the vessel must be closed during this siphoning period, a vertical valve rod is provided, to the middle of which is secured an inverted cup. This cup retains water during the siphoning, and so keeps the valve rod depressed against the upward pull of a weight arm, until the outside water level falls to the cup rim. At this instant, the water breaks from the cup, the siphoning stops; water is again admitted, and the disk, unclamped, overtakes the clock.



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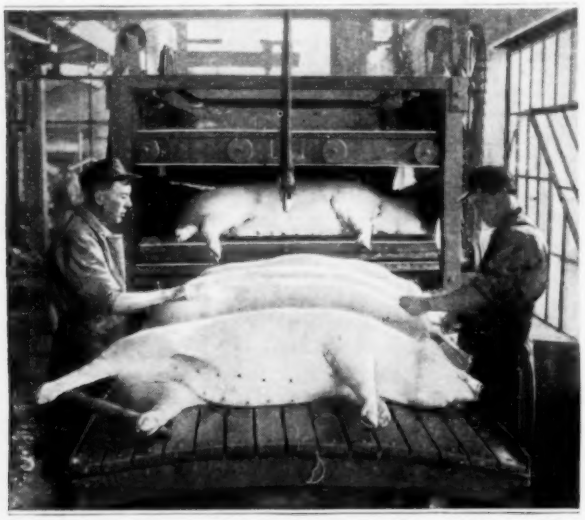
By Means of an Automatic Fog Filter, Shown Above in Two Forms, London's Weather Men Get Hourly Records of the Atmosphere's Impurity. Below, Is the Scale by Which the Disk Records are Graded

HOG CARCASSES DEHAIRED BY ROTATING MASSAGE

Conducted through an ultra-modern hog-slaughtering plant, visitors are always fascinated by a small machine that picks a carcass from the scalding tub, and in 18 seconds drops it on an inspection table with every hair and toenail removed. This result is obtained by the use of 16 rotary disks which rub against the tumbling carcass at high speed. Under the influence of this powerful massage, every hair comes out by the roots, leaving the skin as white as milk. Every part of the body receives attention also, even the nose and ears being cleaned and polished. With its 7½-hp. electric motor, the machine requires a floor space of only 7 by 4½ ft., this economy being caused in part by a double use of the steel "apron." This mechanism not only rolls the hog during the cleaning, but functions as a moving table conveyor, ejecting the animal at the end of the operation.



Picked from the Scalding Tub on the Other Side of This Machine, the Hog is Subjected to the Powerful Massage of Many Rotary Disks Which Remove the Hair and Toenails

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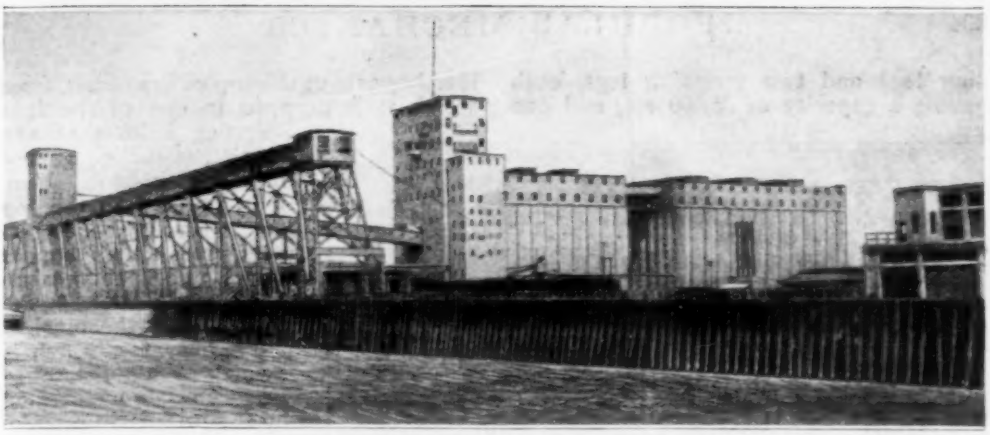
¶ Grand Pré, the "little Acadian village" where Longfellow's "Evangeline" suffered in 1755, and whose present desolation was described in the December, 1919, issue of this magazine, is to be restored and preserved as a Canadian national park. An organization of French Acadians from Nova Scotia, New Brunswick, and Prince Edward's Island, has been formed for that purpose.

COMBINE WOOD AND ASPHALT IN BRIDGE FLOORS

Municipal engineers have equipped two bascule bridges in Chicago with novel asphalt and wood floors, which are declared to be more satisfactory, in some respects, than those made entirely of lumber. Both floors have foundations made from 2 by 4-in. and 2 by 6-in. planks, placed on edge alternately, and nailed together to form a corrugated surface. This assembly is bolted to the bridge stringers. In one case, a mixture of asphalt, sand, and emery was used to fill the grooves between the wider pieces. While this floor provides an excellent traction surface, a six-month test disclosed the fact that the exposed edges of the 6-in. planks wear too rapidly. For this reason, the other floor, constructed at a later date, was covered with sheet asphalt, with a thickness of 1½ in. over the 6-in. planks. Granite chips were rolled into this surface. After three months' service, this floor was in good condition. Some experts are of the opinion that it will require frequent sprinklings in hot weather.

FACTORY PLANTS GOVERNED LIKE SMALL REPUBLICS

Among a variety of more or less theoretical plans for giving the employes of a corporation a share in its management or its profits, or both, one peculiar system stands out with a record of satisfaction in some 50 large manufacturing plants. The arrangement strongly resembles the governmental form of a republic. The company officials constitute the "cabinet," of which the president is head. The "senate" is composed of foremen and responsible department heads, who elect their own leader and committees, and the "house" is made up of representatives the employes select among themselves, numbering about one to every 20. The practical coöperation resulting from the weekly meetings of these bodies has in all instances effected marked reductions in operating costs. Of these savings, 50 per cent goes to the employes in the form of biweekly dividends. The educational feature of the system has banished practically all labor problems.

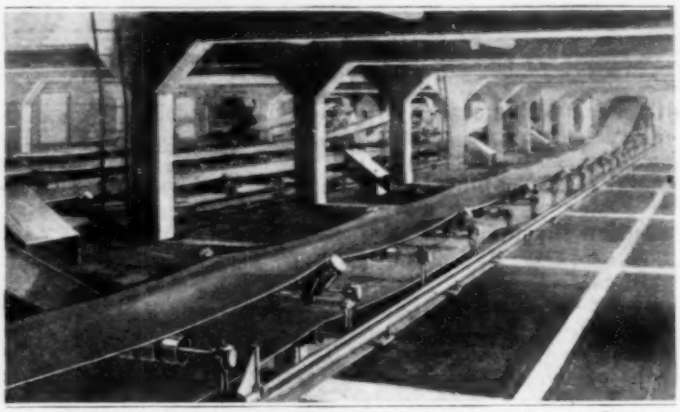


Vast Quantities of Wheat, Destined for Europe, were Handled during the War by This Great State-Owned Elevator, Which is Located at New Orleans

NEW ORLEANS PUBLIC ELEVATOR

By ROBERT H. MOULTON

SOME interesting facts concerning the grain shipped to the allies during the war by the Wheat Export Corporation, acting for the government, have just been made public. These show that of all the ports in this country which were used for this purpose, New Orleans made the banner record, a total of 1,861,000 tons of grain having been shipped from that port. The greatest single achievement credited to the port was the shipping out of 27 full cargoes of grain, ranging from 210,000 to 575,000 bu., with less than 20 hours for clearing each vessel.

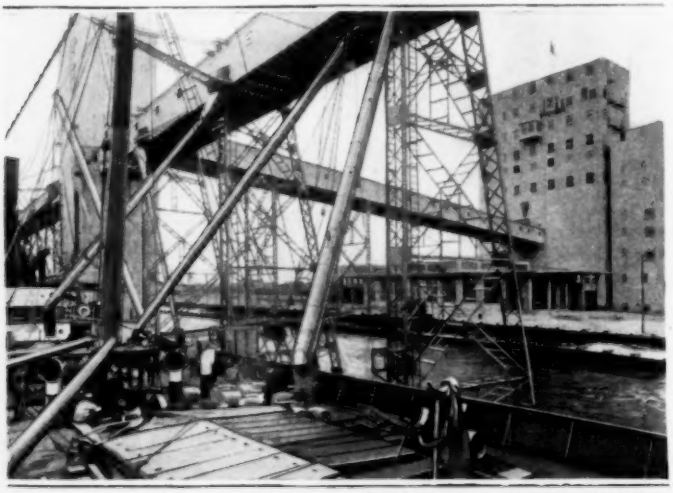


View of the Distributing Floor, Showing the Belts That Convey Grain to the Numerous Bin-Filling Chutes

Sacking Wheat on the Deck of a Vessel: The End of a Loading Spout Is Visible near the Top of the Illustration. Because of the Scarcity of Men Laborers, Some Women were Employed

The public grain elevator of New Orleans was the greatest contributing factor to the quick turnaround of these vessels. This elevator has a storage capacity of 2,622,000 bu., an unloading capacity from cars of 200,000 bu., and from river barges of 60,000 bu. per day, with a delivery capacity to vessels of 100,000 bu. an hour. It is equipped with four ship-

ping legs and two receiving legs, each having a capacity of 25,000 bu., and one utility leg with a capacity of 10,000 bu. per hour. Extreme simplicity and remarkable flexibility of the system of grain distribution throughout the elevator are its chief features.

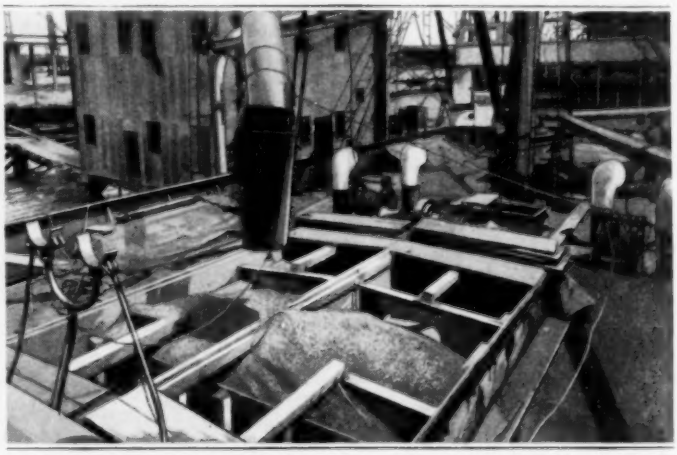


This Picture was Taken on Board a Ship That had Just Received a Cargo from the Enormous Bins

The equipment of the distributing floor includes five elevated belts, each of which is furnished with a trigger, making it possible to trip grain to the different spouts. Underneath this floor is the bin floor, equipped with movable spouts which swing on trolleys overhead. The nozzles of the spouts are inserted in openings in the floor leading to the bins. When a bin is full, the workman lifts the spout by means of a handle near its bottom, rolls it around with a pair of iron rollers, and shifts its nozzle to another bin, there being over 300 bins in the plant, with capacities ranging from 3,000 to 30,000 bushels.

The bin floor is 85 ft. high, and the incline gallery, leading from the marine tower to the plant, is equipped with four belts, each able to convey 25,000 bu. an hour. For the purpose of receiving grain delivered in barges, the marine tower has a pneumatic tube which sucks the grain into hoppers at the top of the tower, from which it is dropped to one of the four shipping belts that run along the incline gallery into the elevator. Here it is shot up to the top floor, through the garners into the hopper scales, and is then taken over the belts, as described, into the bins.

The elevator, which is owned by the State of Louisiana and operated by the Board of Commissioners of the Port of New Orleans, is of steel and reinforced concrete, and is operated entirely by electricity. It is said to be very clean, its efficient dust-collection system reducing to a minimum the danger of explosions, and constituting a most important feature of the big plant.



Looking into a Grain-Filled Hold: The Curved Pipe Seen in the Background Is the Pneumatic Conveyor

CARRY LOAD OF FREIGHT CAR ON TRUCK AND TRAILER

As a freight carrier, the motor truck is often superior to railroads. In support of this claim can be cited the case of an Ohio automobile manufacturer who recently transported 21 touring-car bodies, having a combined weight of 10,500 lb., to his plant from an Indiana City, 100 miles away, with a trailer-equipped truck. Twenty hours were required for the trip,

Loaded with 21 Touring-Car Bodies, Weighing 10,500 Pounds, This Truck and Trailer Traveled 100 Miles, and Delivered the Shipment in Less Than 20 Hours to an Ohio Automobile Factory

this time including that spent in loading and unloading. Shipped by rail, the bodies would have filled a box car, and taken about a week in transit.

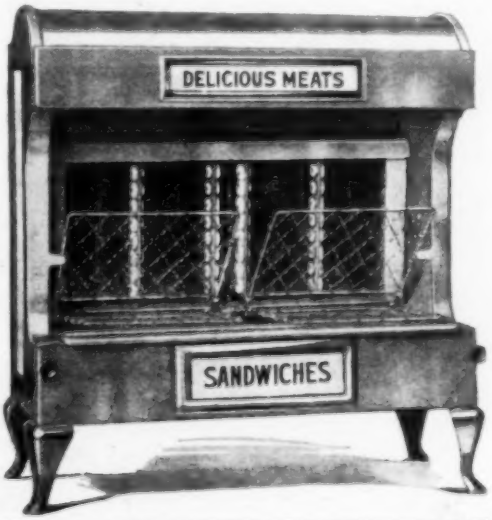
FORTY-MILE TUNNEL MAY GIVE BALTIMORE ITS WATER

Charging that present plans for increasing the water supply of Baltimore are wholly inadequate, an engineer of that city now proposes drawing the new supply from the Susquehanna River, through a tunnel 40 miles long. Some 10 miles of the course already has a 12-ft. tunnel, through which the present supply is brought from Loch Raven, on the Gunpowder River. This bore would be duplicated, and the 30-mile extension planned would open into the Susquehanna just above the dam at McCall's Ferry, Pa. A tunnel, 11 ft. 6 in. in diameter, through solid rock would need no lining, and would utilize gravity flow. Electric power from McCall's Ferry might economically be used for the excavating work, the total cost of the project being placed at approximately $8,000,000. Baltimore thus would be assured, including its present supply, a total of 200,000,000 gal. of water a day, an amount adequate for many years of growth.

¶Recent experiments conducted with rubber-seed oil are declared to have shown the material to be a satisfactory substitute for linseed oil in the manufacture of paints, varnishes, linoleum, soap, and other articles. It is asserted that the seed can be fed to cattle and other live stock after the oil is removed.

ELECTRIC BROILER DESIGNED FOR LUNCH-ROOM USE

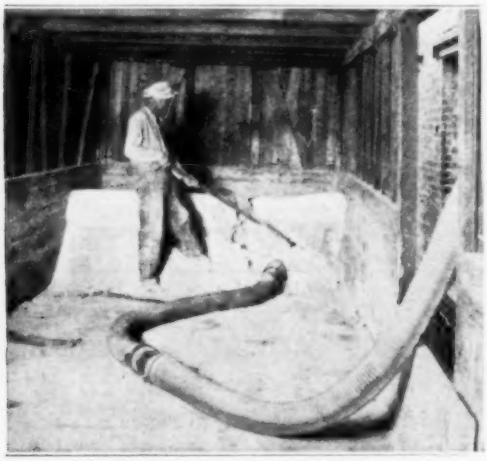
Quick-service restaurants are provided with an efficient mechanical assistant for the preparation of hot sandwiches, and other food, by a new electric broiler, according to the claim of the manufacturers of the utility. Heat-producing coils extend across two vertical frames, which are placed in a hooded sheet-metal case, open on one side. Two double grills, for holding meat, are pivoted near the bottom of the coil frames, and can be swung near the latter, or withdrawn, by means of levers at either end of the case. Current is switched on by the first operation, and turned off by the second.



This Novel Electric Broiler is Intended for Use in Restaurants Where Food must be Prepared in the Shortest Possible Time

UNLOADING DEVICE REMOVES MATERIAL BY SUCTION

Operating in the same manner as a vacuum cleaner, a new suction unloader



Removing Soda Ash from a Freight Car with a Suction Unloader: No Irritating Dust is Raised by This Method, Which Transfers Material Very Rapidly

removes the contents of freight cars or vessels with great speed. The essential parts of the device are a tank, in which a partial vacuum is maintained, and a flexible hose. Pulverized or granular material is drawn through the latter, and deposited in the tank. Grain, coke, soda ash, and other products, can be handled by the contrivance, which is made in several different sizes, some capable of transferring 150 tons an hour. Only one man is necessary to attend the unloader.

HUGE METALLIC MIRROR USED IN NEW FRENCH LIGHTHOUSE

On the little island of Galita, in the Mediterranean Sea off the north coast of Tunis, the French government has lately erected a lighthouse embodying several departures from conventional design. The optical apparatus is most noteworthy, as it is made entirely of metal. The great parabolic reflector is composed of four sections, each of which is built of a special bronze, gilded and highly polished. The diameter of the big mirror is 7 ft. 5 in., with a focal length of 26 in., making this the largest metallic reflector used in any lighthouse in the world. The flash is of 202,000 cp., and during most of the year can be seen at sea for a distance of 30 miles.

SANTA CLAUS RIDES IN TRUCK EQUIPPED AS HOME

Traveling across the continent in a motor truck, which has been transformed into a mobile home by the addition of a special body, a modern Santa Claus not only brings joy to children in the cities he visits, but earns his living by advertising the products of a toy factory. In this case the mythical character is an invalid, who was compelled by ill health to seek outdoor employment. He is accompanied by his wife, who acts as Mrs. Santa Claus. Juvenile letters to the saint can be posted in a mail box on the machine, which is appropriately decorated with wreaths, sleigh bells, and flags.

An Up-To-Date Santa Claus Lives and Travels in the Motor Truck Pictured on the Left. With the Addition of a Special Body, the Vehicle has been Transformed into a House, in Which He Carries the Products of a Toy Factory. The Saint Himself can be Seen on the Right, Leaning Out of a Window in His Mobile Home

PELTS INCREASED IN VALUE BY COLDER CLIMATE

Nature provides fur-bearing animals with coats which vary in weight to suit the climate of different localities, being heavy in cold regions, and lighter where higher temperatures are the rule. Taking advantage of this fact, a western trapper transports live catches made in the lowlands to the mountains, where the weather is more severe, and holds them in captivity for some time before disposing of their pelts, which are greatly increased in value by this means. As an experiment, 10 raccoons, caught near the coast, were taken to a ranch, located 9,000 ft. above sea level, and kept for six weeks, during which time they were carefully fed. The animals were then killed and skinned. Because of the improvement in quality, the hides were sold for three times the amount they would have brought in their original condition.

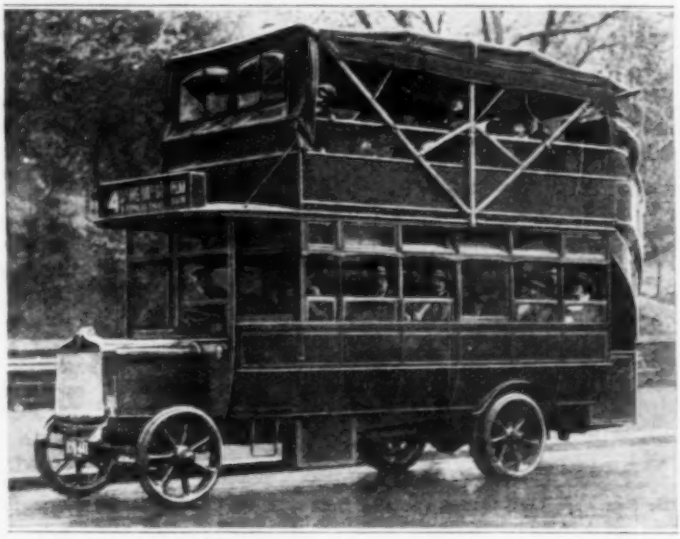
EUROPEAN POULTRY DECIMATED DURING WORLD WAR

Egg production is at a very low ebb in Europe as a result of the war. According to one expert, there are now 180,000,000 fewer hens on the continent than there were in 1913. Belgium's poultry population suffered most, being reduced to 20 per cent of its pre-war size. Holland lost 75 per cent of its chickens, while France and Denmark are each minus 50 per cent. Great Britain was more fortunate, losing only about 10 per cent of its fowls, which leaves approximately 19,500,000 survivors. Before the war, Britain depended to a great extent on Russia, Germany, and Austria-Hungary for its supply of poultry and eggs.

¶California will have a permanent and continuous exposition of its products and resources at Sacramento, if a vigorous movement just started in that city materializes.

RAINPROOF TOPS COVER UPPER DECKS OF NEW YORK BUSSES

Formerly, when rain fell on New York City, the tops of the famous Fifth Avenue busses were swept bare of passengers, while operators suffered a consequent loss of revenue. The busses carry capacity loads in all weather now, however, as folding rainproof tops have been added. Care had to be taken to make the total height with this new equipment less than the clearance of the elevated railroad at certain points.



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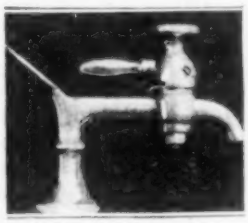
The Addition of Folding Tops to the Busses on the Streets of New York City Enables Them to Carry Capacity Loads in Fair Weather or Foul

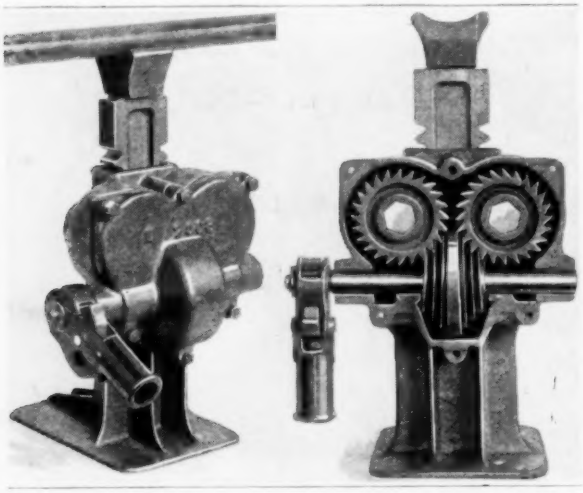
DRINKING FOUNTAIN COMBINED WITH WATER FAUCET

Two purposes are served by a new plumbing fixture, though the device differs little in appearance from an ordinary water faucet. Turning the handle to the right or left causes water to flow from the regular outlet, while a downward pressure puts into operation a drinking fountain, located on top of the tap. The latter movement is facilitated by a projection, designed to be gripped with the fingers, while the thumb is used to depress the handle.



CURIOUS GEAR ARRANGEMENT IN NEW LIFTING JACK

An uncommon form of gearing is used to give power, smooth action, and self-locking quality to a new lifting jack. The lifting bar has a rack cut on opposite sides, engaging two pinions. On each pinion shaft is a toothed wheel. Inserted edgewise between these wheels from below is a disk with both faces conical, a spiral worm being cut in each face. The spirals engage the teeth of the wheels, which turn in opposite directions when the shaft of the worm disk is turned, advancing one tooth for each revolution of the shaft. One advantage over the regular worm gear is the absence of end thrust.



The Complete Jack is Seen at the Left. In the Right-Hand View the Open Casing Reveals the Peculiar Form of Gearing

NOT WALKER'S PIPE LINE

Although no names were mentioned in our recent story of a sub-river pipe line connecting a Canadian distillery with the American side, Hiram Walker & Sons, Limited, Walkerville, Ont., feel we should assure our readers that their company was not the one referred to. This we gladly do, as the high standing of the Walker concern for more than half a century makes such a suspicion unthinkable.

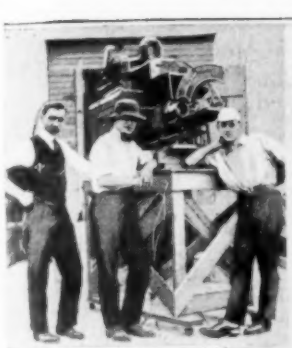
Wishing to avoid dishonor to the uniform, the warden of the Ohio penitentiary has decreed that ex-service men under sentence must doff their soldier or sailor clothes before passing through the prison gates.

HEXAGONAL TEMPLE TO HOUSE NEW YORK COUNTY COURTS

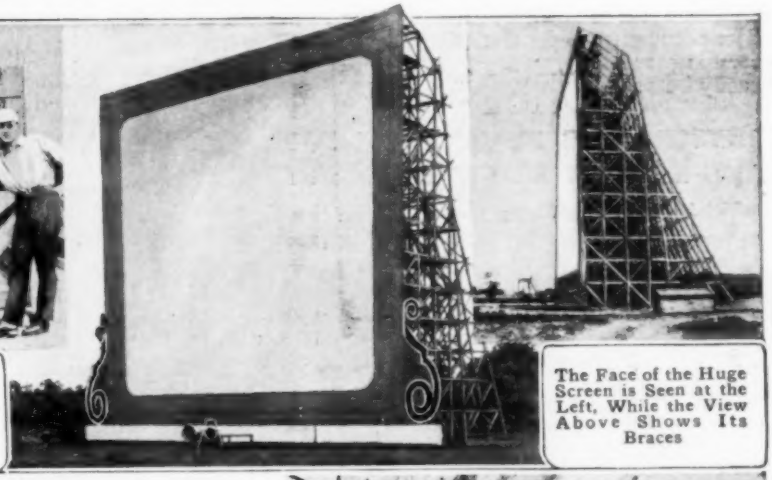
Plans for the monumental, circular Temple of Justice, that was to have been built in New York City at a cost of $21,000,000, have been abandoned. Instead, plans now call for a hexagonal structure which will be just as capacious, but will cost only a third as much. The entire exterior, including the Grecian portico of the west face, will be of granite. Behind this portico will be ranged the library stacks, record rooms, minor offices, and so on, leaving the five other sides, with their better illumination, for the rooms of the city and county courts. These are to be built about the central rotunda, and in isolated, double units. Each unit will be complete in itself, consisting of two courtrooms, with all necessary consultation rooms, jury rooms, robing rooms, and toilets. Business in each court will thus proceed undisturbed by happenings in adjacent units.

BRIDGE OVER NIAGARA RIVER STRENGTHENED BY REPAIRS

Heavy modern railroad trains can now pass in perfect safety over the great steel bridge that spans the Niagara River near the famous falls of the same name. This has been made possible by reinforcement and readjustment of the structure, which was built 22 years ago, when rolling stock was much lighter than it is today. Anticipating still further increases in the weight of locomotives and cars, the engineers in charge of the work placed the bridge in condition to bear the traffic expected in 1940, basing their calculations on statistics compiled during the last 70 years. One of the most important operations was the construction of a new floor under the tracks. This included the installation of a novel drip pan underneath the ties, and the addition of metal to the brackets which partly support the floor beams. Light-rod braces were replaced by rigid material, which reduced sidesway to a remarkable extent. Steel joists were substituted for the old timbers under the highway floor, located under the tracks, rendering it capable of sustaining a 15-ton motor truck.



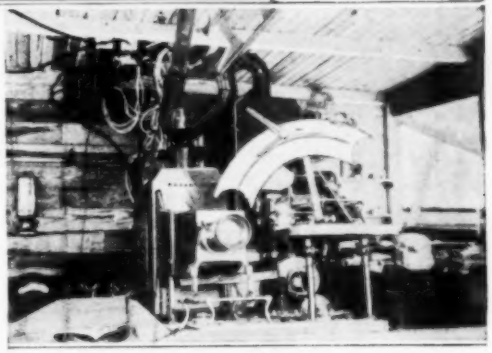
The Big Lantern Withdrawn from Its Booth, Giving a Good Idea of Its Great Size



The Face of the Huge Screen is Seen at the Left, While the View Above Shows Its Braces

PICTURE SCREEN AND LANTERN BREAK ALL SIZE RECORDS

Screen pictures of heroic size are exhibited in an extraordinary outdoor theater which has been installed at an Ohio race track. The heavily braced screen measures 132 by 165 ft. over all, the projection surface being 100 by 75 ft., and visible to an audience of 110,000. The "throw" from lantern to screen is 315 ft. Because of the heat from the great arcs, the lamp houses of the twin stereopticons are of enormous size, with motor-driven blowers for cooling the condenser lenses and exhausting the overheated air. Slides 5 by 7 in., instead of the standard 3¼ by 4, are used, and may be shown for a full minute without heating, while 24-in. panoramic slides are fed through the gate in 40 seconds by a motor. Five to seven men are needed to operate the lanterns and cooling arrangement. An interesting experiment was the exhibition of clear motion pictures on the giant screen with a standard-size machine, breaking all projection records.



Close-Up View of the Double Lantern in Its Booth, Showing the Ventilating Pipes, the Blower Below, and the Arc-Shaped Dissolving Shutter

GERMANS ADAPT METAL WAR PLANE FOR TRADE USE

German determination to produce a satisfactory all-metal airplane is evidenced by the fact that one large company concerns itself solely with the construction of this type of aircraft. For fighting use, it produced a two-seater monoplane of rather unusual appearance, characterized chiefly by an absence of all wing-bracing wires. And that this type is now being put to commer-

Forming the Fuselage, Wings, and Tail of This Converted German Fighting Machine, Are Sheets of Thin Metal, the Corrugations in Which may be Seen in the Photograph

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cial use is proved by the photograph. The corrugations in the thin sheet metal forming fuselage, wings, and hull can easily be seen.

SKYSCRAPERS BUILT FROM TOP AND BOTTOM SIMULTANEOUSLY

With office space at a premium, the skyscrapers now built in the large cities are

The Demand for Speed in the Construction of Metropolitan Skyscrapers is Met by Building Both Up and Down, Thus Finishing the Construction in the Middle

usually rushed to completion with all possible speed. A favorite scheme for accelerating construction is illustrated by the accompanying photograph, taken from a New York office building. The roof and top floor of the building in the foreground are practically finished, ornamental cornices and roof structures being all in place; while the three floors below offer strange contrast, with their steel girders showing like uncovered bones.

RAILROAD MOUNT FOR COAST-DEFENSE GUN IS SUCCESS

Recent firing tests, at Cape Henry, Va., of the new railroad mount for the 14-in. gun were so satisfactory that all weapons of this caliber will hereafter be installed on such carriages, as they become available. Firing a 1,660-lb. projectile, the big gun was directed with remarkable effect at a moving naval target, nearly 15 miles from shore. The maximum range, however, exceeds this by some three miles, and a few improvements in design suggested by the test will bring the range up to 40,000 yd. Incidentally, the test was not only the first of this type of mount, but was more notable as the first in which a 14-in. gun on a railroad carriage has been fired from a coast-defense station.

CUBA HAS NEW GLASS PLANT USING NATIVE MATERIALS

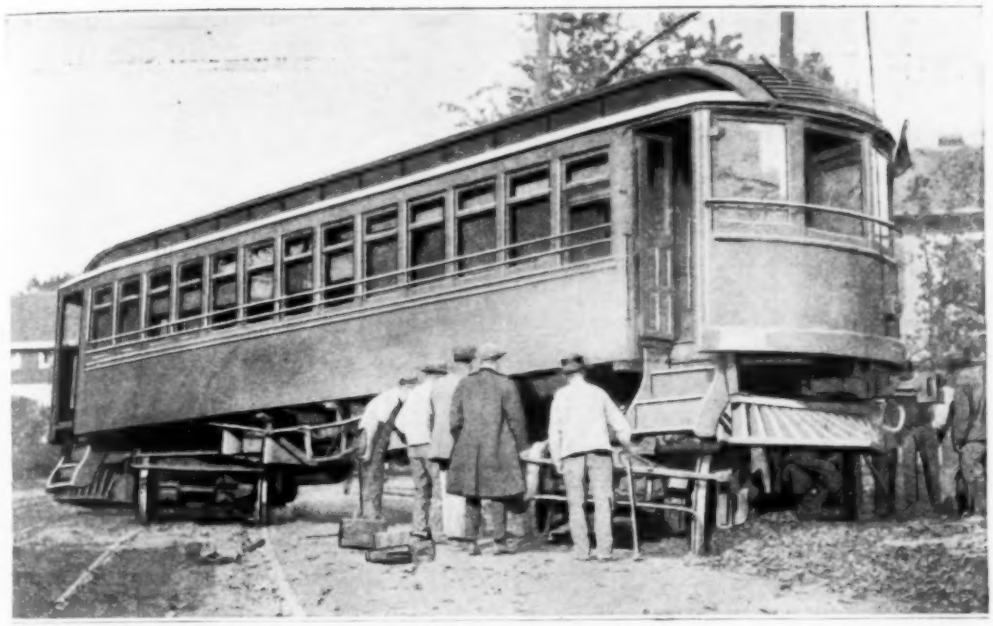
A native abundance of high-grade glass sand and limestone has inspired the establishment of a large plant at Havana, Cuba, to manufacture table and illuminating glassware and bottles. The 3,000 acres of sand controlled by the new organization, first of its kind on the island, contains an average of 99.43 per cent of silica. The equipment is American.

AUTOMOBILE RADIATOR SHIELD REGULATED BY HEAT

Controlled by a simple thermostat, a new cold-weather automobile radiator protector acts automatically, admitting air only after the water in the cooling system becomes warm. The device consists of a steel shell, designed to fit over the core of a radiator, and equipped with horizontal shutters, which are connected to the thermostat, located at the top of the shell, by a series of rods and levers. Two spring-bronze cells and an aluminum heat conductor, which bears on the radiator, compose the thermostat. Until the water reaches 130° F., the shutters remain closed; when that temperature is attained,

Self-Regulating Radiator Cover: The Picture at the Right Discloses the Thermostat. A Front View is Shown Above

they begin to open, and are fully expanded at 175 to 180° F. A push button is provided for closing the shutters, and locking them in that position.



A Stone about the Size of a Man's Fist is Said to have Caused the Derailment of This Heavy Suburban Car. Had It been Traveling Faster Than 16 Miles an Hour, It would Probably have Overturned, Inflicting Serious Injury on the Passengers. As It Was, the Car was Caught and Held by a Steel Trolley Pole

SMALL STONE DERAILS HEAVY ELECTRIC TROLLEY CAR

Officials of a traction company operating in and about Cincinnati, Ohio, can explain in only one way the recent derailment of a heavy suburban car. They believe that a stone, jarred from the roadbed by the front truck, fell back on the rail in time to derail the rear truck. Whatever the cause, it is certain that the car traveled for some distance with the front wheels holding the track, and the rear wheels in the center of the roadway. The rear vestibule at length encountered a steel trolley pole, which aided the brakes in bringing the car to a stop. Luckily it had been traveling at only 16 miles an hour; at a higher speed it would doubtless have overturned, with serious consequences to the passengers.

CONCRETE TELEPHONE BOOTHS USED BY RAILROADS

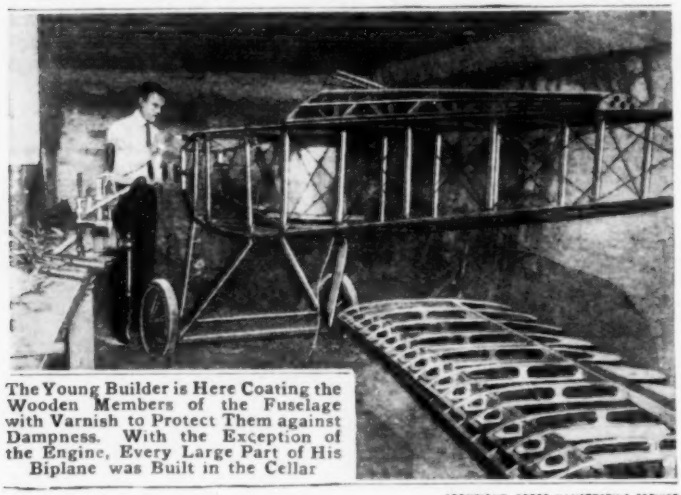
Concrete telephone booths have recently been found well suited for use along the right of way of railroads and electric lines. Designed as a cylinder, topped by a conical roof, the booth is not unsightly, and will last indefinitely. Construction is simple, involving the molding of only four parts—base, body, door, and roof—which are easily transported and quickly set up where desired. In order to protect the telephone within, the door lock is so coupled to a switch that the electric circuit is open except during use.

Intended for Outdoor Use along the Railroad Right of Way, This Concrete Telephone Booth is Made of Only Four Parts

¶ In the salt wells of Szechwan Province, China, of which there are more than 1,000, from 1,000 to 3,000 ft. deep, over one per cent of potassium salts has been found, promising a possible new source of the mineral.

YOUTH BUILDS AIRPLANE IN CELLAR OF HOME

Nearly every American boy has at one time or another "built things" in a cellar workshop; seldom, however, have those endeavors resulted in anything so pretentious as a full-grown airplane, complete with engine and propeller. The young airplane builder, just a few years removed from boyhood, has here fashioned and assembled fuselage, wings, struts, and undercarriage. Each of these is intelligently designed, and constructed according to the best aeronautical practice. The nose of the fuselage is being prepared for a four-cylinder engine of automobile type.



The Young Builder is Here Coating the Wooden Members of the Fuselage with Varnish to Protect Them against Dampness. With the Exception of the Engine, Every Large Part of His Biplane was Built in the Cellar

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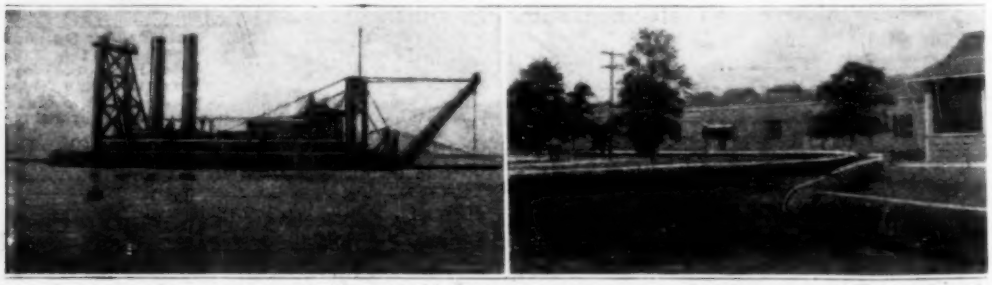
¶A large hangar is being built at El Paso, Texas, for a twin-engined airship which will be used by the army for patrol along the Mexican border. If a success, the service will be expanded.

NEW ZEALANDERS EXPERIMENT WITH CANADIAN GEESE

Twenty mated wild geese were shipped from Canada recently to New Zealand, where they will be added to a flock of 800 of their species, the property of a society which is bringing birds to the islands from different parts of the world, with the object of acclimating them. Experiments with wild geese were instituted by the organization several years ago, when 12 pairs of the birds were imported from the North American dominion. These formed the nucleus of the present large flock. It is hoped to improve the flock with the latest consignment, through the introduction of new blood. Naturalists differ as to where the Canadian wild goose hatches its young, but the location is generally supposed to be somewhere north of the arctic circle. The New Zealand experiment has aroused the interest of many scientists.

NAVAL BASE GAINS NEW LAND BY MOVING SEASHORE

Between 800 and 900 acres of new land, and a harbor 40 to 50 ft. deep, have been acquired without purchase by the new naval operating base on Hampton Roads, Va. By a huge engineering operation, the shore line was literally moved outward, from ¼ to ½ mile, on three sides of the base, a dozen or more big suction dredges transferring mud and sand from



Naval Base Gains New Land: Left, a Dredge of 36,000 Cubic Yards, Daily Capacity, Largest of Its Kind; Right, Part of the Mile-Long System of 28-Inch Pipes through Which the Sand is Pumped for Filling in the Great Area of Made Land

The Sea of Mud and Water at the Left will Dry Out and Become New Land, Leaving the Old Seashore, in the Distance, Far Inland. At the Right Is the Discharge End of the Mile-Long 28-Inch Filling Pipe, Transferring Sand and Gravel from the Harbor Bottom to the Made Land

the bottom of the harbor to the made land. The largest dredge used has a capacity of 36,000 cu. yd. a day. The fill in some places was 25 to 30 ft. deep, the material being discharged through 28-in. pipes, one of which was over a mile long. An old hotel and buildings of the Jamestown exposition, formerly on the beach, have been left far inland.

BIG PLANE ENDS SUCCESSFUL FLIGHT AROUND COUNTRY

Completing a flight of almost 10,000 miles around the "rim" of the United States, a Martin twin-engined bomber recently rolled into its hangar at Washington, D. C., whence it had started on July 24. Flying from Washington to New York, to Augusta, Maine; across the northern states to Oregon; down the California coast; then along the Gulf and back to Washington, the big plane accounted for 9,823 miles in 104½ hours' flying time. In other words, in circumnavigating the country, it spent a little more than four days in the air.

Though the bomber had flown 110 hours previous to July 24, it continued to prove as reliable, in its element, as any ocean liner. Only once was it seriously delayed, when in northern New York State a heavy fog and defective landing gear brought about a crash on landing. Thereafter the long journey was broken only six times by forced landings, and all of these were caused by adverse weather conditions. The splendid performance, with the pilot's subsequent report on landing fields and meteorological conditions, means much to the air service.

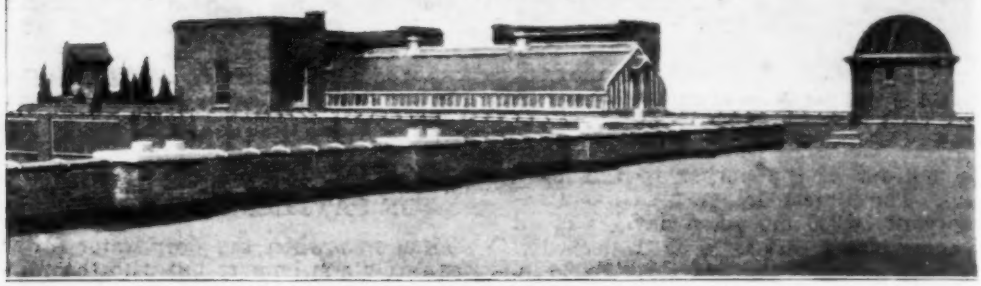
SAILOR DIVES FROM END OF BATTLESHIP'S CRANE

Time was when the deep-water sailor was rarely a swimmer; but with the wartime enlistment of so many American boys in the U. S. Navy the old tradition finds itself hard hit. On the rolls may now be found the names of many aquatic experts. And it was one of these, of the U. S. S. "Mississippi," who lately astounded his shipmates by diving from the end of a giant crane, 100 ft. above the water. A few minutes later he came over the side, none the worse for his experience, to be received as the hero of the hour by everyone on shipboard.

The Sailor in the Oval has Found a New Use for the Ship's Giant Crane. The Camera has Caught Him, Above, at the Start of the 100-Foot Drop to the Water Below. The Feat Suggests That the Day of the Non-Swimming Tar Is Past

ARTISTIC ROOF GARDEN FEATURES CITY FACTORY

By Allen P. Child



Located on Top of a Manufacturing Plant in Cleveland, Ohio, Are a Beautiful Roof Garden, a Conservatory, and an Observatory, to Which Employes can Go for Recreation during the Noon Hour, or at the End of the Day

WHEN a Cleveland, Ohio, manufacturer of metal products decided to erect a new building to take care of increased business, he made up his mind to have the roof serve a somewhat more useful purpose than just to cover the structure. So he developed a plan of installing a roof garden for the recreation of the factory employes, and provided an extra floor, in order to give adequate clubroom facilities for the social life of the workers.

Located on the fourth floor of the new building, the various rooms are well laid out. A short corridor from the entrance at the head of the stairway leads into a lounging room, 60 ft. long by 40 ft. wide. Antique-oak paneling on the walls is relieved by ornamental plaster ceilings. Wicker furniture with tasteful cushions invite those who seek rest, while writing and game tables are handy for those who do not wish to be idle. Provisions are also made in this lounge for motion-picture entertainments.

The library is well stocked with encyclopedias, and many works of fiction, historical, travel, and periodical literature. Decorative library tiles are set in the plaster walls, and the ceiling is embellished with a plaque of Neptune and his horses riding the waves.

One of the Most Popular Rooms in the Building Is the Cozy Inglenook, with Its Huge Fireplace with Decorative Panels over It, Tile Walls, and Rough-Hewn Woodwork. The Comfortable Seats are Filled to Capacity throughout the Rest Periods

The real center of attraction is the large English inglenook with its entrances from the lounging room, library, and bowling alleys. The room is finished in tile and adz-hewn woodwork. Over the fireplace a series of tile panels depicts episodes from the story of Rip Van Winkle. The women's rest room is finished in antique blue and old rose, with furniture, rugs, and hangings in perfect harmony.

From the fourth floor a stairway leads to the roof. The first place en-

The Attractive Spanish Garden Overlooks Lake Erie, Which can be Seen in the Background. Diminutive Fir and Cypress Trees are Planted in the Grass Plots

A Corner of the Library: Here can be Found Reference Books, Periodicals, and Many Volumes of Fiction. One of the Bookcases, Set in an Arched Recess, Is Visible in the Picture

In the Women's Rest Room, Blue and Old Gold are Combined in the Decorations. Handsome Wicker Furniture, Including a Convenient Writing Desk, is Provided

Sunlight and Fresh Air Abound in the Spacious Lounging Room, Where Tables and Chairs Are at Hand for Those Who Wish to Write, Play Games, or Read. Moving-Picture Entertainments are Sometimes Given in This Room

tered is a greenhouse where flowers are grown for use about the offices and clubrooms. The entrance to the Spanish garden is through two French windows. Tiny cypress and fir trees are planted in geometrically arranged grass plots. Ample room for walkers is furnished, and instead of the usual tarred gravel roof of most factory buildings, there is a tiled garden floor. At the extreme end of the garden is an exedra with a wall fountain.

Beyond the greenhouse, in a continuation of the garden, is an astronomical observatory equipped with a powerful telescope, where regular classes of employes gather to study the elements of astronomy.

STEEP ARTIFICIAL GRADE IS NO OBSTACLE TO TRACTOR

Climbing a smooth grade of 45 per cent, which means an angle of nearly 24°, is hard enough for a pedestrian with hobnailed shoes, and seemingly impossible for a wheeled power vehicle. Both a steam and a gasoline tractor, however, performed the feat at a recent state fair, the grade being built for the occasion, of heavy planks. The machines ascended and descended again, always under full control and apparently with the utmost ease. But the strain of the performance was shown by the fact that the planks of the incline had to be renewed every day. They were chewed to splinters by the bite of the drivewheel lugs, without whose tractional aid the most powerful of engines would have been helpless.

Steam Tractor Climbing a 45-Per-Cent Grade of Smooth Planks under Perfect Control, as a Demonstration of Its Power

UNUSUAL ADVERTISEMENT AIDS ANTIACCIDENT CAMPAIGN

Carelessness is personified, and caused to blame itself for most of the world's misery, in an unusual advertisement, issued recently by the Retail Trade Board of the Boston Chamber of Commerce, as part of an antiaccident campaign. The novel message, which was printed on window cards, billboard posters, and in newspapers, was worded as follows:

WHO COMES HERE?

I am more powerful than the combined armies of the world.

I have destroyed more men than all the wars of the world.

I am more deadly than bullets, and I have wrecked more homes than the deadliest of siege guns.

I steal, in the United States alone, over $300,000,000 each year.

I spare no one, and I find my victims among the rich and poor alike; the young and old; the strong and weak; widows and orphans know me.

I loom up to such proportions that I cast my shadow over every field of labor from the turning of the grindstone to the moving of every railroad train.

I massacre thousands upon thousands of wage earners in a year.

I lurk in unseen places, and do most of my work silently. You are warned against me, but you heed not.

I am relentless. I am everywhere: in the home, on the streets, in the factory, at railroad crossings, and on the sea.

I bring sickness, degradation, death, and yet few seek to avoid me.

I destroy, crush, maim, take all, and give nothing.

I am your worst enemy.

I am Carelessness!

GOLD OBTAINED FROM RUBBISH NEAR OLD STAMP MILLS

Unusual salvaging operations are in progress at two South African stamp mills, which were abandoned after being employed for years to extract gold from ore obtained in near-by mines. Rubbish heaps in the vicinity of the plants are being systematically searched for the precious metal, and a large quantity has been recovered in a short time. A very simple method is used to accomplish this result. Waste matter is collected and run through sluices, which separate the coarse material from the fine. The latter is then mixed with inflammable waste and burned. Further sluicing of the resultant product removes the gold. One of the mills was started in 1897, and crushed 4,700,000 tons of ore before it was stopped. Nearly 3,000 oz. of pure gold, worth approximately $60,000, have thus been obtained.

FLAMING OIL TANK ROLLS THROUGH KANSAS TOWN

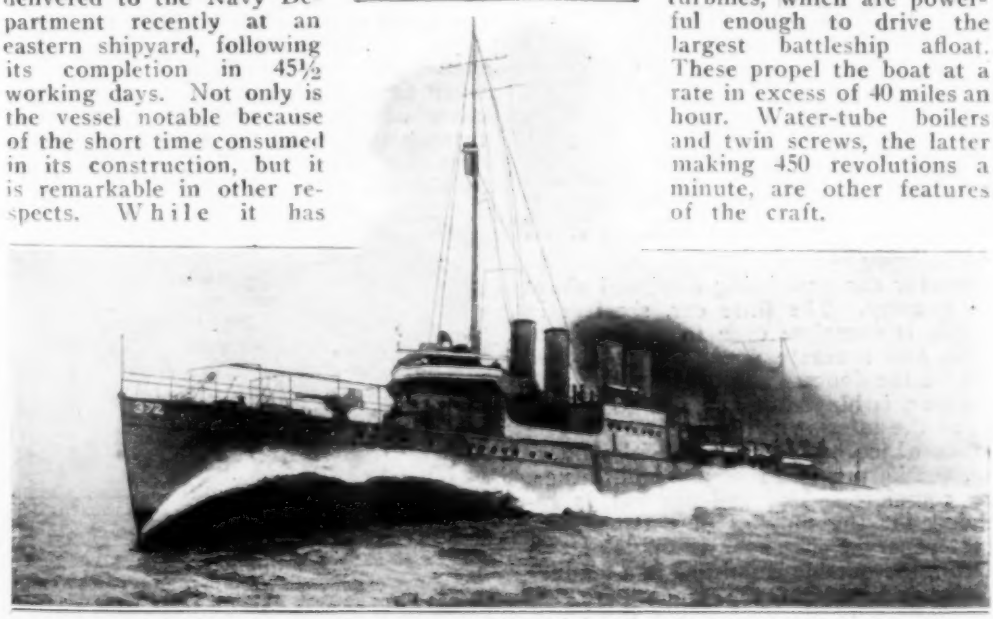
Impelled by some malign, mysterious force, the 16,000-lb. gasoline tank which recently exploded at Hays, Kan., shot, not vertically but horizontally, through the air. In its flat flight of some hundreds of feet, the flame-belching cylinder rose no more than three or four feet from the ground. Every foot of its path was consequently marked by ruin. It demolished and fired two barns; snapped two telegraph poles and an eight-inch tree like toothpicks; then, touching earth, fell on its side. Rolling on, the flaming Juggernaut mangled and killed four spectators, supposedly at a safe distance from the conflagration; broke off three heavy stone posts; leaped a ditch, and finally pushed a house off its foundations and fired it. This destruction was wrought almost 500 ft. from the origin of the disaster.

Above Lies the Gasoline Tank, at the End of Its Destructive Journey. To Its Left Are the Smoldering Ruins of the House It Last Encountered

The Crosses at the Left Show Where Three of the Four Bodies were Found. These Persons had been Standing on the Sidewalk, 20 Feet Away and Supposedly at a Safe Distance from the Blaze; Yet They were Caught and Mangled by the Huge Projectile

FAST DESTROYER COMPLETED IN BRIEF PERIOD

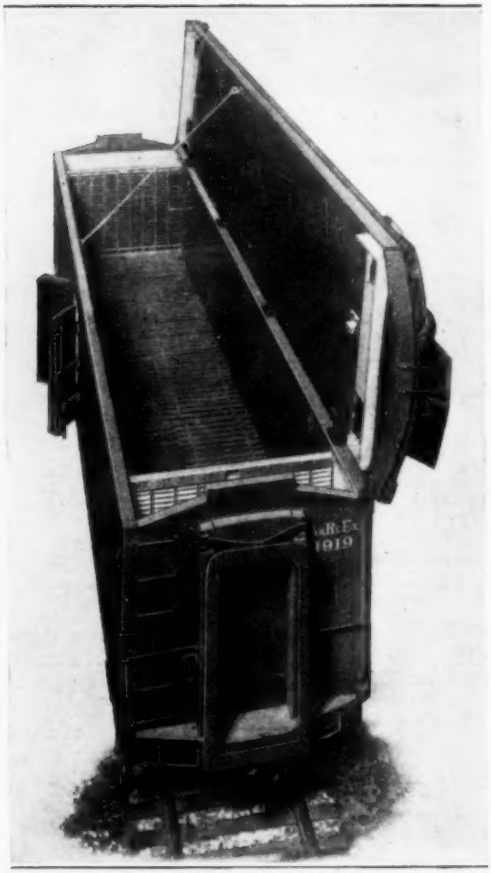
Record-breaking speed was made in building the destroyer "Reid," which was delivered to the Navy Department recently at an eastern shipyard, following its completion in 45½ working days. Not only is the vessel notable because of the short time consumed in its construction, but it is remarkable in other respects. While it has a displacement of only 1,200 tons, the ship is equipped with 27,500-hp. steam turbines, which are powerful enough to drive the largest battleship afloat. These propel the boat at a rate in excess of 40 miles an hour. Water-tube boilers and twin screws, the latter making 450 revolutions a minute, are other features of the craft.



The Destroyer "Reid," Which was Completed Recently in the Remarkably Short Time of 45½ Working Days, Traveling at Full Speed: Steam Turbines, Capable of Developing 27,500 Horsepower, Drive the Vessel

EXPRESS REFRIGERATOR CAR SHOWN IN MODEL FORM

Those who delight in well-made models would take keen pleasure in examining the miniature replica of a new express re-



Six-Foot Model of Express Refrigerator Car: It Differs from a Real Car Only in Its Size and Its Hinged Roof, Here Open for Inspection of the Interior Arrangement

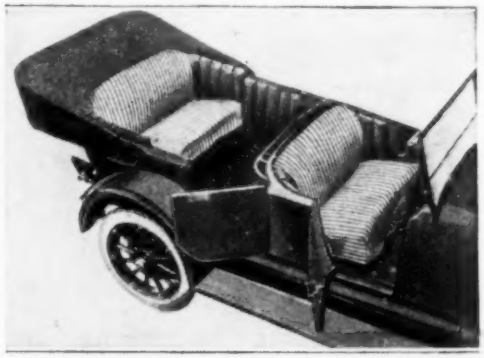
frigerator car now being displayed about the country. The little car, six feet in length, is complete even to a section of track, and accurate down to the special lock on the doors. The top of the model, however, is hinged at one side to form a lid, so the interior can be examined. The details of ice bunkers, slatted false flooring, ventilators, and roof and end fittings, are complete. The full-size car is intended for the moving of early perishable crops via passenger train. For this reason, the outside is finished in a manner wholly different from the standard freight-car exterior, to harmonize with the coach work of its high-grade associates.

LATIN TAUGHT IN BRITAIN'S AIR-SERVICE SCHOOL

That youngsters make the best flying officers is evidently the continued belief of Britain's air ministry. For in establishing the Royal Air Force Cadet College, near London, the ministry has ruled that candidates for admission must be between the ages of 17 years 6 months and 19 years. Exception is made only in the case of certain men from the army, who will be accepted up to 21 years. It is noteworthy, too, that the curriculum of this aviation "West Point" includes many classical and cultural subjects. Thus, optional courses include Latin, Greek, advanced mathematics, modern languages, science, and elementary engineering. Otherwise, the first two years of training will give the young cadet the widest experience in the classroom, the workshop, the drill and athletic fields, the machine-gun pits, and in the air itself.

WASHABLE AUTO-SEAT COVERS QUICKLY BUTTONED IN PLACE

To cover the cushions of the pleasure car, and so protect the garments of the motorist, there are now made slips of washable fabric that can be buttoned in place in two or three minutes. The work of placing the tack buttons for the first set of covers consumes about 20 minutes; thereafter the same buttons are used when slips are changed. A motorist using these slips usually finds it convenient, when parking his car, to button back the cover of the seat cushion proper. Returning to his car, he spreads the cover over the seat again, finding it unsoiled by blowing dust and soot.



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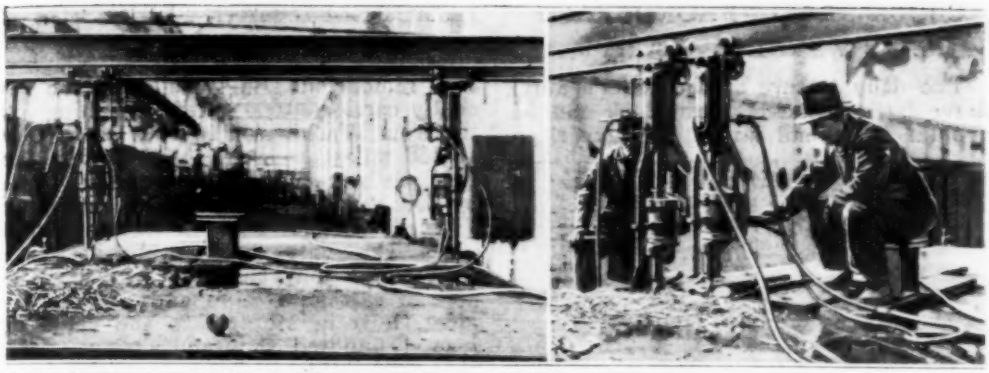
Held in Place by Tack Buttons, These Washable Seat Covers are Easily Removed. As the Fabric may be Had in Many Colors, the Autoist Is Able to Harmonize Covers and Car Finish



Suspension of Heavy Machine Drills from an Overhead I-Beam, in Position for Travel to Any Part of the Work, is Made Plain in the Left View. At the Right, Two of the Machines are Seen Drilling Heavy Boiler Plate

HEAVY MACHINE DRILLS MOVE LIKE TRAVELING CRANE

When work to be handled in a shop is heavier than the tools required, it is of obvious advantage to make the tools portable. In a western plant where boiler plate is drilled, the heavy electric drills have been fitted with carriages at the top, which permit them to roll on the flanges of an I-beam overhead. The ends of the I-beam, in turn, are fixed to supports which travel on track rails on the floor. As many as four drills may be hung from the beam and used simultaneously without interfering with each other. Three thicknesses of 1⅜-in. boiler plate are drilled together, in an average time of eight minutes per hole.

PANAMA CANAL LOCKS CAUSE PECULIAR WATER SURGES

Pedro Miguel lock, in the Panama Canal, has a capacity of about 3,800,000 cu. ft. of water, and it is filled in a minimum of 7½ minutes. This sudden, large movement drops the canal surface about 1½ ft. at the lock, and sets up a current of about one foot a second. When the lock valves are closed, a surge results, whose wave form may be as high as three feet from trough to crest. The surge wave travels back along the canal, and is still measurable 14 miles away, as well as over seven miles up the Chagres River. The trough phase of the surge follows about 45 minutes behind the crest, and the effect is perceptible at Gamboa, eight miles up the cut, 18 or 19 minutes after the lock valves are operated. The wave returns in reduced amplitude, and finally dies out.

ROUND SHOULDERS PREVENTED BY NEW DESK AND CHAIR

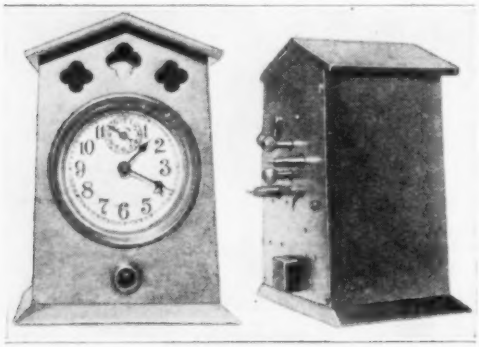
A new combination school chair and desk is designed to prevent round shoulders and other deformities in growing children by making correct sitting postures easy to assume. The back of the chair contains two crossbars, so placed that an erect position is comfortable, and a slouching one the reverse. It is possible to adjust the desk, which is fastened on the right front leg of the chair, as to height, inclination, or distance from the back. The article can be fitted with a special back and other attachments, which allow it to be converted into a reclining chair.

Combined School Desk and Chair: Children are Encouraged by This Equipment to Sit Erect

¶The zoo at Tokyo, Japan, is soon to acquire one of the relatively few hippopotami in captivity. The river horse is the gift of a Japanese prince now resident in Seoul, Chosen.

CLOCK STARTS PHONOGRAPH AS MORNING ALARM

The daily torture of the toiler's aural nerve by a strident alarm clock can be avoided in several ways. He may sleep



Instead of Ringing a Bell at the Rising Hour, This Clock Pulls In the Stud, Seen at the Right, Thus Allowing the Record Disk to Revolve. Pressure on the Button, at the Left, Arrests the Disk

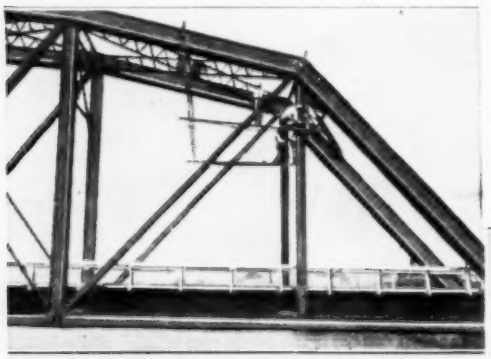
all morning, or he may buy a gentle awakener now on the market. This little alarm clock rings no bell at the rising hour; instead, it retracts a horizontally projecting stud from the rear of the clock case. By placing this projection against a phonograph disk and releasing the disk starter the night before, this retraction allows the disk to revolve, and the record to be played.

REMODELED MAIL PLANES GAIN IN CAPACITY AND SPEED

A remodeled DH-4 mail airplane recently carried 30,000 letters, weighing 630 lb., from Washington to New York City at 138 miles an hour. This betters the best performance of the standard plane by 300 lb. and some 15 miles. And on this remarkable gain in capacity and speed the post-office authorities base their prediction that they will soon be able to salvage DH-4's and Liberty engines, now in storage, to the value of several hundred thousand dollars. The remodeling process shows promising freedom from complication and expense. An extra span is set into each wing; while the 12-cylinder engine is removed from the nose of the fuselage and split into two engines of six cylinders each. These are secured to the lower wings, on either side of the fuselage, thus adding to cargo space, and reducing fire hazard by eliminating proximity of engines and fuel tanks.

NEED FIVE MONTHS EACH YEAR TO PAINT BIG BRIDGE

Painting a big steel bridge is never a trifling task, but down near the Gulf of Mexico, where the salt, moist air quickly destroys the paint, the job becomes nearly a continuous performance. A 2,200-ft. railroad bridge of nine spans, crossing the Atchafalaya River, is painted every 12 to 16 months, and it takes a crew of 12 men about five months to complete the job. Their labor, with the thousands of gallons of red-lead and carbon-black paint used, runs the total expense of the yearly undertaking up to nearly ten thousand dollars.

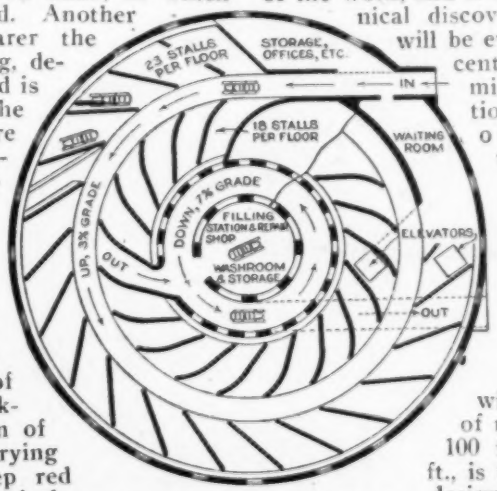


Seven of the Big Bridge's Nine Spans Are Visible Here, and It will be Appreciated That Painting It Is Quite a Job. Above, the Painters are Seen Starting Their Five Months' Task That must be Repeated Each Year

TOWERLIKE GARAGE CONTAINS SPIRAL DRIVEWAYS

To provide parking space for automobiles in the congested business districts of big cities, a Michigan architect has planned a novel garage, which will accommodate a large number of cars, but occupy only a small site. The proposed building resembles a circular tower, 160 ft. in diameter and 200 ft. high. It is designed to shelter 800 machines. Two doors are provided, one to serve as an entrance, and the other as an exit. The former gives access to a spiral driveway, leading to the top of the structure. Along both sides of this driveway are numbered stalls, in which cars are to be stored. Another spiral driveway, nearer the center of the building, descends to the exit, and is used by cars leaving the garage. Elevators are employed to carry patrons to stalls at different levels.

View of the Proposed Circular Garage: Portions of the Walls are Cut Away to Show the Spiral Driveways, the Storage Stalls, and One of the Passenger-Elevator Shafts. Arrows Indicate How Automobiles Enter and Leave the Structure



In This Plan can be Seen the Interior Arrangement of the Towerlike Automobile Garage, Which is Designed to Accommodate 800 Motor Cars

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A continuous belt of flowers, 10 miles long and made up of some 130,000 annuals, is the newest addition the city of New Orleans is making to its collection of beauties. Roses varying from white to deep red will be the feature of the beds, which ultimately will be extended to all parts of the city.

ALLOYS TO BE MADE SUBJECT OF SCIENTIFIC RESEARCH

A sustained scientific effort is about to be made to penetrate the mystery of alloys, those apparently lawless combinations of metals whose product often differs so radically in its properties from any of its constituents. With governmental assistance, a new cooperative association is being organized, representing manufacturers and users of alloys. The organization will employ scientists and technical experts, who will devote all their attention to thorough research into the subject. All members of the association will benefit by the results of the work, and it is expected that technical discoveries of great value will be evolved from the concentration of trained minds upon investigations hitherto pursued only by individual workers.

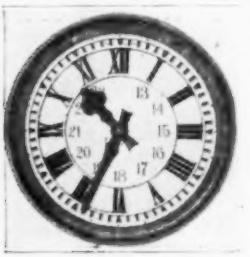
CANAL MAY CONNECT MISSISSIPPI AND RIO GRANDE

An inland waterway whose length will be many hundreds of miles, with a width of 100 ft. and a depth of 9 ft., is the ambitious project designed to connect the Mississippi River with the Rio Grande, and greatly shorten the travel of ship-

ments between Texas and Louisiana. Oil and sugar are the commodities that will be directly benefited by the completion of the new canal, which, unless unexpected opposition develops, should come to pass in the next 10 years.

FAMOUS LONDON STATION HAS TWENTY-FOUR-HOUR CLOCK

General use of the 24-hour clock in England is foreshadowed by the recent installation at Waterloo Station, London, of a great electric timepiece of this type. As seen from the photograph, the hours from midnight to noon are indicated by Roman numerals, those from noon to midnight by Arabic numerals. The clock's construction arouses keen interest, also, as the four large dials are apparently without clockwork. Close inspection shows, however, that a small box behind each pivot contains a wheel and magnet. These units are controlled by a master clock giving the hands a forward impulse every half minute.



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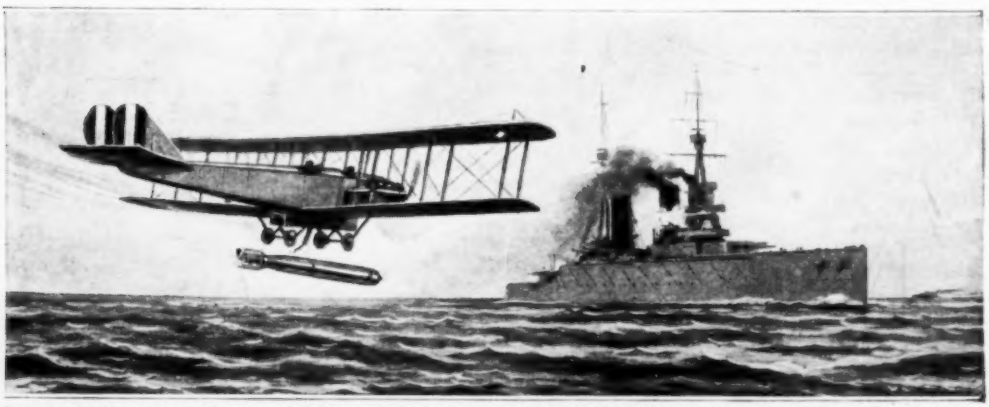
¶Violin music, continued for a number of hours, is reported to have been used successfully by a New York physician to awaken a woman patient who had slept for six weeks; and the method will be tried in other cases of prolonged unconsciousness.

AIRPLANE HAILED AS TORPEDO BOAT OF THE FUTURE

The torpedo plane is, perhaps, not to be the decisive naval weapon of the future, yet it was undoubtedly foremost in the mind of a former first sea lord of the British admiralty when he made a prophecy that has astounded England. "The air controls the water," he wrote; "unless all warships can get under the water, they will be blown out of the water." This high personage envisions the naval contest of the future as a brief and ludicrous struggle of lumbering battleships against lightning-swift torpedo planes which will dive from the clouds to within a few feet of the water, release their torpedoes at the ships' broadsides, then "zoom" unharmed into the clouds again. He reminds that the thing has already been done, by British planes in the Dardanelles.

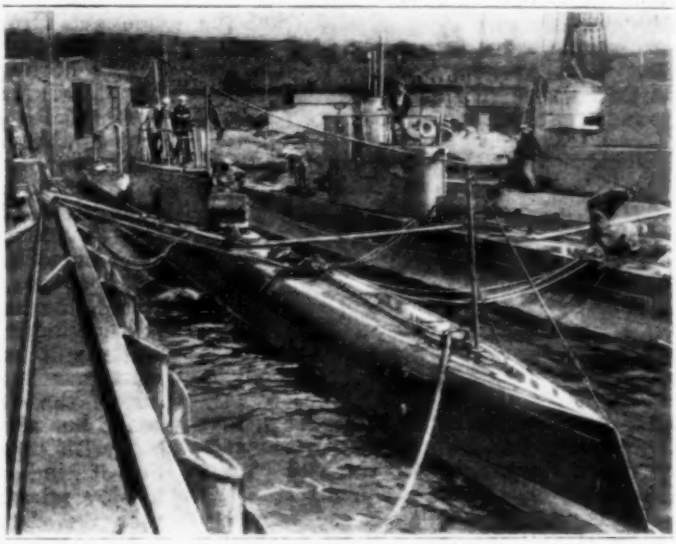
The United States Navy has not been slow to realize the potential value of such a weapon for the defense of our long, open coast. The torpedo plane was, in fact, invented by an American rear admiral, in 1912; it figured in recommendations to congress last January, and soon a large plane of this type will be added to the equipment of the fleet. As the first of 10 planes contracted for, it is now being assembled at an inland city. All of them are to be of the familiar twin-engined bomber type, costing between $40,000 and $50,000 apiece, and designed to carry fuel for six hours' flight at 100 miles an hour. Three men, armed with two Lewis machine guns, will compose the crew, one of them having charge of the regulation 2,087-lb. torpedo, slung between the two halves of the double undercarriage.



America's Shores are Soon to be Protected by 10 Aerial Torpedo Boats like the One Pictured Above. Rising from the Decks of Our Battleships, 600 Miles to Sea, the Planes will Swoop Down upon the Vessels of the Invader, Release Their Torpedoes as Shown, Then Fly Back to the Coast under Their Own Power. A Target Moving at Such a Pace Is Difficult to Hit with Guns in Present Use

WIRE LOOP ON SUBMARINE ENDS RADIO TROUBLES

Seemingly the simplest element of radio equipment, the antenna proved the most troublesome when applied to submarines. The trailing wires were a constant menace when traversing a mine field, and not infrequently they caught on the propeller of the boat. Experiments by U. S. Bureau of Standards engineers and naval officers have evolved a new form of construction, consisting of a single turn of wire, arranged in a loop, from a short mast in the center of the boat to each end of the deck. This so-called "aerial" transmits and receives with great power when entirely submerged, as well as when the boat is afloat or half submerged, and as its position is fixed, it cannot become entangled with other articles.



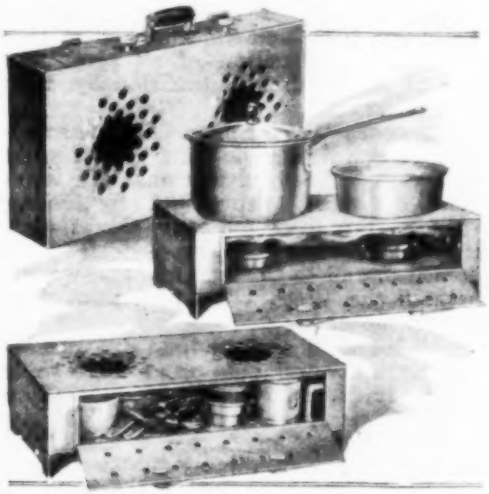
Submarine Equipped with Single-Turn Loop Type of Radio Antenna, Which Passes from a Mast at the Center to Both Ends of the Boat

ASKS BELGIUM TO KEEP COAL AND SELL ELECTRICITY

Italy's industries use 60,000 tons of Belgian coal a month, and would take a million if transportation difficulties did not forbid. To ship it by rail costs the prohibitive sum of $36 a ton in freight charges. An Italian scientist calculates that Belgium could convert its coal directly into electric power at 150,000 volts, and deliver it over a copper line at a little less than one cent a kilowatt-hour, allowing 12 per cent for interest, depreciation, and maintenance on a $280 transmission line, and 20 per cent for line losses. One ton of the coal produces only 500 kilowatt-hours, so the cost figures are decidedly favorable to the electrical method.

TINY COOKSTOVE RESEMBLES SMALL SUITCASE

Similar in appearance to a small suitcase, a diminutive cookstove, recently invented by an eastern man, can be made ready for use in a few seconds, and is suitable for the preparation of a large meal. Canned solid fuel is burned in the device, which is made of sheet metal, perforated in such a way that it is possible to place vessels directly over two flames. The stove is supplied with a carrying handle, removable legs, and a lid that can be fastened when shut. Food, tableware, cooking utensils, and a supply of fuel, besides the legs, can be packed inside the stove.



When Closed, as Shown Above, This Stove Resembles a Suitcase. On the Right, the Device Is in Use, While Below, It is Packed with Supplies

WHY ROB THE GILA MONSTER OF ITS VENOM?

By ROBERT H. MOULTON

CERTAIN individuals of Santa Fe, N. M., have sent up a loud wail because all things that once made the great Southwest fearsome and thrilling are disappearing one by one, and soon the place will be no more wild and woolly than Fifth Avenue, New York. The immediate cause of this lament is the announcement by the University of Arizona,

This Is the Gila Monster, Formerly the Southwest's Favorite Hair-Raiser. It Is Now the Object of Attack by a Scientist Who Affirms That Its Bite has Never Yet Caused Death

after long and painstaking research, that there never has been an authentic case of death resulting from the bite of the Gila monster. What a shame!

Of course this will be sad news to those of us who, ever since our early youth, when we read and were horribly fascinated by accounts of the deadly venom and ferocious ways of this reptile, have cherished the hope that some day we might have the pleasure of observing—from a safe distance—the creature pulling off a few stunts in its native haunts, particularly that interesting little one of expelling its poisonous breath with a vicious hiss, and causing the instant death and destruction of all plant and animal life within a traditionally wide circumference.

But that's all over now. Trust a scientific shark to take the thrill out of what has always been mysterious and awe-inspiring until science got to fooling with it. For there are other things, also, it appears—many others—which once helped to add to the wildness and woolliness of the West, but which now, alas, are no more.

For instance, a short time ago the investigators found out, or at least so it is said, that the hydrophobia skunk's bite is no more dangerous than that of the common house or Thomas cat. The axalotl, whose deadliness the people of the Southwest once fondly cherished as one of their most popular and well-known dangers, was eaten up in large numbers by the fish when trout were planted in a lake in the Pecos country. Whereas it was once proudly told the effete that the tarantula could jump 50 feet and bite while he was still jumping, throwing the victim at once into fatal spasms, they are now assured that he can only crawl at a snail's pace and that all one gets from his nippers is a severe headache.

The horny toad's peaceful and affectionate disposition and lack of offensive potentialities have become so well-known that Southwesterners can lie about him no more; the scorpion is becoming a harmless joke, and it is declared that youngsters of that locality do not hesitate to hitch them to paper wagons and drive them about.

Of course, they still have their old friend, the rattler, theme of a thousand hair-raising narratives, whose murderous rattle still makes both Westerner and Easterner jump sideways and volplane out of the way when he rears his ugly head; but who knows? The Moki handle him with impunity and make a necklace out of him, and one of these days some kill-joy scientist will step out and prove that the diamond-back, when you get right down to facts, is as harmless as a fishworm, and that his reputation for frightfulness is founded on nothing more substantial than the pink-elephant dreams of a chronic souse.

RARE SUGAR FOUND IN HIVES OF AMERICAN BEES

Melezitose is a sugary substance always much desired by scientific laboratories, but previously about as plentiful as radium. Occurring in a honeyed incrustation on a leguminous tree in Persia, it was formerly imported in minute quantities, and at considerable expense. But now it has been found in Pennsylvania, neatly stored away, in the honeycombs of ordinary hives. Experts of the Federal Bureau of Chemistry explain its presence there as the result of attacks on scrub pine by certain plant lice and other insect species. In the course of their activities, these parasites produce a honey dew which is rich in melezitose. Attracted to this "dew" when the clover flowers have ceased to yield honey, the bees bear it to their hives for future consumption. When winter comes, however, they find it indigestible, and often die of starvation. Bee farmers are consequently warned against this unusual sugar; but American chemists are glad to know that melezitose can now be secured in sufficient quantities without importation.

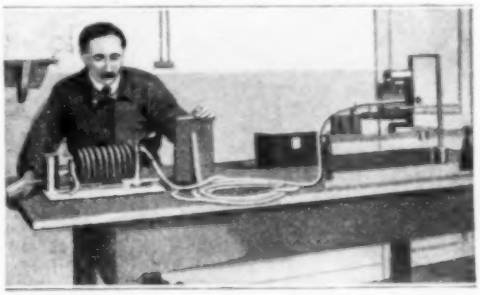
Drawn by Five Horses, This Mechanical Corn Husker is Stripping the Ears from the Stalks, Then Husking the Ears, and Dropping Them into the Accompanying Wagon at the Right

MECHANICAL HUSKER REPLACES LABORERS IN CORNFIELD

With the expense of husking corn gone to 8, 10, and 12 cents a bushel, many corn-belt farmers have thought it best to buy mechanical huskers. Thus machinery again does work once thought possible only for human hands. Drawn by five horses, or a small tractor, the husker strips the ears from the stalks by means of two revolving cylinders, which also remove the husks. A conveyor then carries the ears to a chute which drops them into the accompanying wagon. The mechanical husker has its limitations, of course, functioning rather inefficiently in very poor corn, and in corn with many fallen stalks. It balks, too, at picking up loose ears from the ground. But in good corn, not an ear is missed in a day's work.

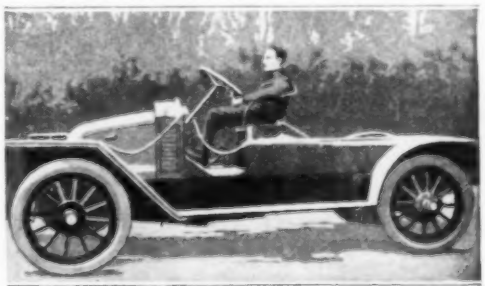
METER RECORDS VIBRATIONS ON REVOLVING DRUM

Vibrations of automobile frames, airplane wings, or other objects of test are recorded for further study by means of a new instrument of French origin. A diaphragm loaded with a heavy metal disk closes an air chamber, forming the transmitting part. The receiver is a similar chamber, whose diaphragm is connected to a stylus resting upon the lampblacked surface of a drum revolved by clockwork. A rubber tube connects transmitter and receiver. The latter is calibrated before use by comparison with a vibrating rod, which has an adjustable weight to vary



The Receiving Chamber with Its Recording Drum Connected by a Rubber Tube with a Vibration Transmitter in the Laboratory

the period of its motion. When the receiver is vibrated, the inertia of the loaded



Installation of the Vibration Meter on the Front of an Automobile Frame, Whose Vibrations are Recorded on the Revolving Drum of the Receiver for Later Study

diaphragm causes air fluctuations to be transmitted to the recording stylus.

SMOKE EXPERT IN AIRPLANE SAMPLES AIR ABOVE CITY

For very good reason Salt Lake City was the scene of the first aerial analysis

The Smoke Inspector is Shown Just before His Airplane Tour over Salt Lake City. In the Bottles, Here being Exhausted by the Air Pump, He Later Collected His "Samples" of Contaminated Atmosphere. These Samplings were Made at a Definite Altitude, and Supplemented by Photographs

of a city's smoke problem. The inter-mountain city, though not the only one cursed by this modern blight, is peculiarly handicapped in her fight against it. Near-by mountains form a pocket in which the smoke hangs in heavy clouds, when no high winds are blowing to dissipate them. These murky masses are seen almost daily from the ground; but only the other day were they examined first hand for elevation, size, and density. A smoke expert from the U. S. Bureau of Mines made the tour of inspection in an airplane. At various specific altitudes he noted air currents and smoke conditions, snapped photographs, and actually collected "samples" of the tainted atmosphere in bottles he had previously exhausted with an air pump. On the value of his reports and analyses is said to hang the future use of the airplane in this novel capacity.

STEEL ANCHOR CHAINS FORMED BY POURING INTO SAND MOLDS

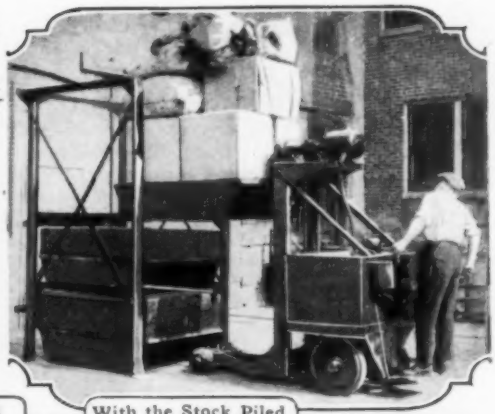
Anchor chains of all sizes and lengths are now being made quickly and successfully by pouring steel into cunningly contrived molds of sand, and thus casting the entire chain at one time. Chains used in the past have been of wrought iron, made by bending and welding straight iron bars. Steel chains, however, constructed in this old-fashioned way were usually too ductile to keep shape, or so brittle that the welds were weak. Cast chains of steel are free from these defects. The makers of this new commodity insure high quality by using nothing but steel from the electric furnace. In addition, after the castings have cooled, they are shaken out of the molds and given a special tempering heat treatment.

¶ Though its people are rapidly succumbing to oppression by the nefarious Turk, the land of Armenia is unbelievably rich in iron, copper, marble, and gold.

LIFT PLATFORM ADDED TO ELECTRIC TRUCK

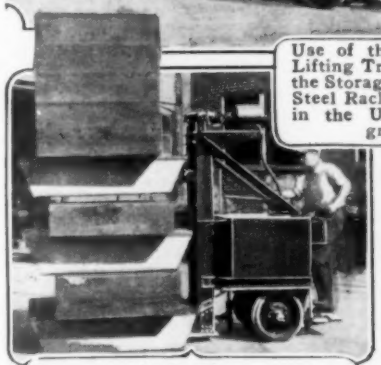
Believing that there is a place in every large factory for a machine that saves storage space, job time, and labor cost, a manufacturer of industrial equipment is now producing a storage-battery truck with an elevating load platform. The truck itself is carried almost entirely on the rear wheels, space above the front wheels being reserved for the cantilever lifting arms and the load they carry. Steering on all four wheels, the truck is able to turn in a circle of 92 in. diameter, and is thus well qualified for operation in congested stock rooms and freight-car interiors. Ball bearings and worm drives are used throughout.

As the cantilever arms can raise a load of 4,000 lb. to a maximum height of 76 in., use of this truck permits advantageous reorganization of factory routine and layout. Much unskilled labor may be released, as the machine not only bears its load from the warehouse, but lifts it to the exact level of a box-car floor or motor-truck platform; heavy castings may be positioned and held conveniently above the lathe bed while being centered, and other applications will suggest themselves amid other conditions. Most reorganization is possible in the warehouse, however, where the heaviest stock may be kept in racks of two, three, and four tiers. Storage capacity of a given floor space will in this way be doubled or tripled.



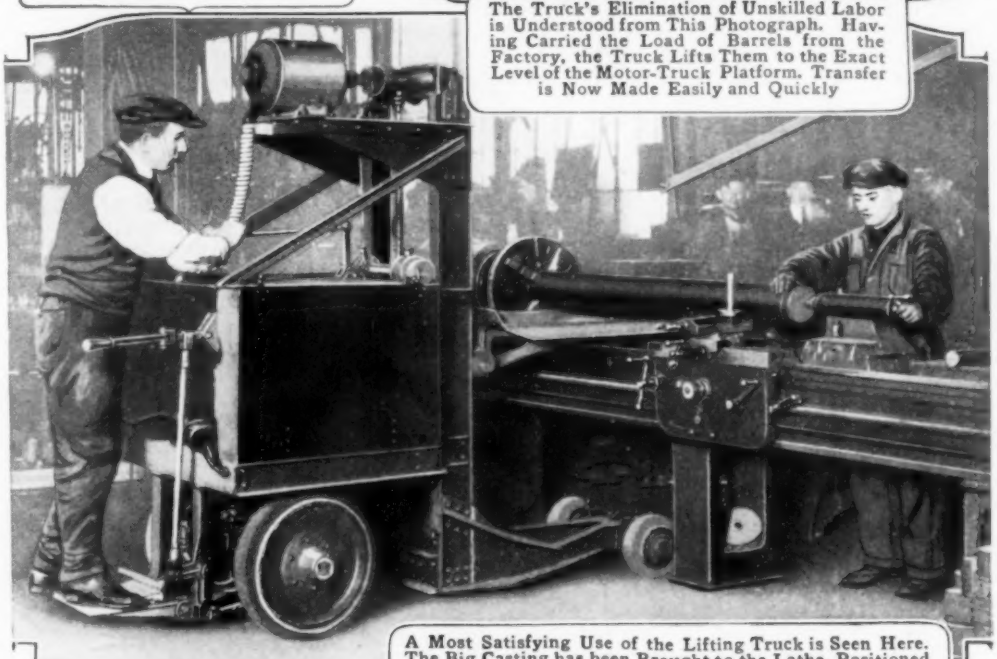
Use of the Electric Lifting Truck Permits the Storage of Stock on Steel Racks like These in the Upper Photographs

With the Stock Piled on Small Wooden Platforms, the Truck is Able to Slip Its Cantilever Arms under the Load, Then Elevate It, and Back Away



Lowering the Cantilever Arms to Floor Level, the Operator has Thrust Them under an Imposing Pile of Warehouse Stock, Which He will Later Distribute

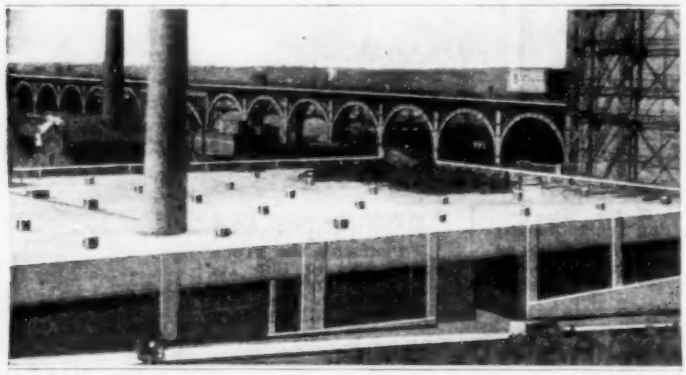
The Truck's Elimination of Unskilled Labor is Understood from This Photograph. Having Carried the Load of Barrels from the Factory, the Truck Lifts Them to the Exact Level of the Motor-Truck Platform. Transfer is Now Made Easily and Quickly



A Most Satisfying Use of the Lifting Truck is Seen Here. The Big Casting has been Brought to the Lathe, Positioned over the Bed, and is Now being Centered by the Operator. Incidentally,, the Truck Has Three Speeds Forward and Three Reverse

BUS-GARAGE ROOF ARRANGED FOR ADDITIONAL STORY

When more floor space becomes necessary in a one-story garage recently erected in an eastern city by a motor-bus company, it will be easy to add another story to the structure. Pillar foundations were built through the roof, and are in readiness to receive the supports for a higher shelter, while the roof itself is strong enough to serve as a second floor without alteration. The building was constructed on a slope, so that the roof is on a level with one street, and the floor with another. Snowplows and trucks are now kept on the roof.



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Protruding from the Roof of This Motor-Bus Garage can be Seen the Pillar Foundations That were Built to Make Easy the Addition of a Second Story

AMERICAN CHEMISTS DISCOVER SECRET OF SOY SAUCE

Oriental countries have been for years the sole producers of soy sauce, used in practically all meat condiments mixed in this country, but now the United States seems likely to become a rival of China and Japan in the manufacture of this commodity. Government chemists, after only a year's work, announced recently that a fair quality of soy sauce had been made by them, though the method employed in the Far East requires five years to accomplish the same result. Soy beans, roasted wheat, a mold known as yellow-green aspergillus, and brine, are its ingredients.

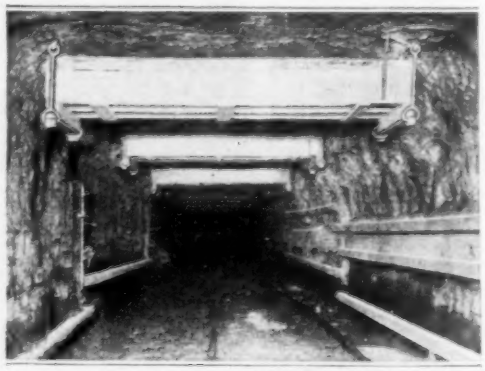
¶ New spectroscopic equipment and methods are being developed for the analysis of helium gas, in the hope of finding coronium, chief ingredient of the solar corona, and hitherto regarded as a nonterrestrial substance.

HIGHWAY ENGINEERING TAUGHT IN 115 AMERICAN COLLEGES

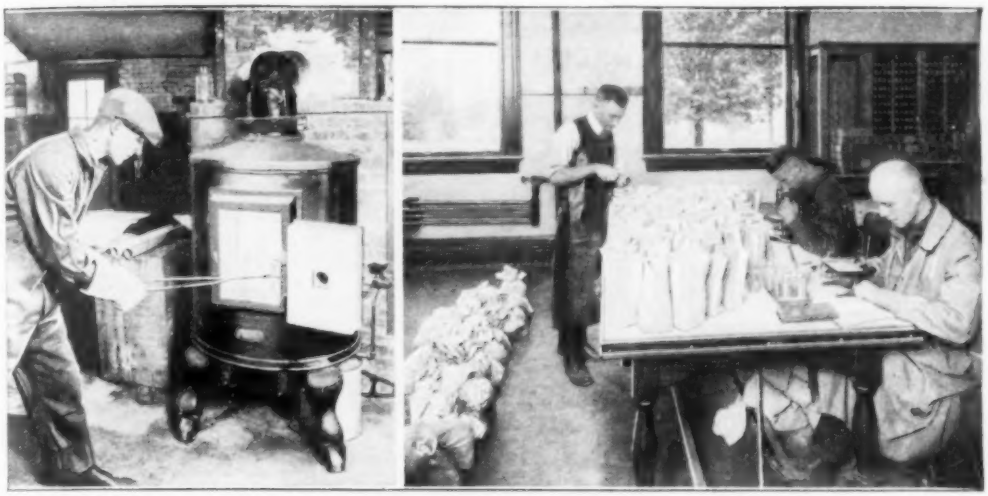
Of encouraging interest to those who hope some day to see the United States close-bound by a well-planned system of roads is the recent report that of 127 technical schools throughout the country, 115 are now giving courses in highway engineering. Such response of the colleges to popular enthusiasm not only gives permanence to the "good roads" movement, but proves that the road work of the future is to be in expert hands. And that these college-trained men are to have work to do is shown by another report, which reveals that the treasuries of counties, states, and nation now hold a grand total of $1,300,000,000 for road building and maintenance.

STOP COAL-MINE EXPLOSIONS WITH CLOUDS OF ROCK DUST

Fighting dust with dust is the new and curious method adopted by the U. S. Bureau of Mines for neutralizing the effect of coal-mine explosions. Long wooden boxes, filled with rock dust, are suspended across the roof of each mine gallery at frequent intervals. An explosion of coal dust shatters the boxes, and the resulting cloud of incombustible rock dust smothers the flame and cuts off its progress, ending the blast before it is fairly started.



Rock Dust Contained in Wooden Boxes Hung from the Gallery Roofs of Coal Mines, Effectively Smothers the Flame of Explosions



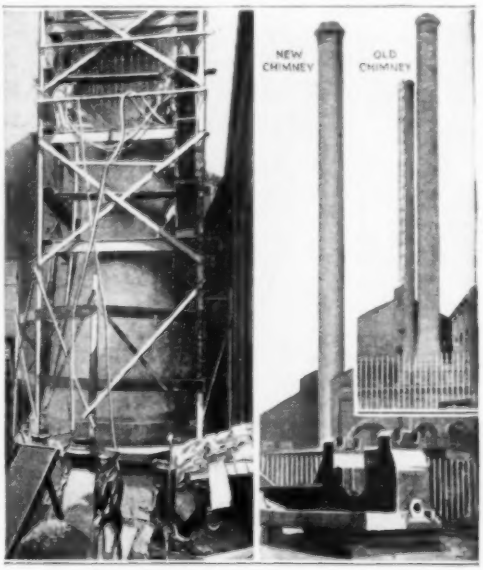
The Diversified Art of Making Earthenware Products Is Now the Subject of Expert Instruction at Several Large Universities. Students of the Ceramic Courses at a Western School are Shown Above. At the Left, Test Bricks of Clay are being Drawn from an Oil-Fired Kiln with a Temperature Range up to 2,500° Fahrenheit. The Students at the Right are Testing Samples of Clay to Determine Their Geographical Origin

UNIVERSITY MEN STUDY CERAMIC ENGINEERING

The addition of a four-year course in ceramic engineering to the curriculum of a great western university emphasizes the growing importance and multiformity of this profession. A student who elects to work for this new degree of Bachelor of Arts in Ceramics finds that the study is divided into seven general parts. Crude ceramics includes building and paving brick, sewer pipe, drain and roofing tile; architectural and majolica ceramics includes terra cotta, enameled brick and tile, and the crude forms of pottery; fine ceramics includes art and domestic china, porcelain, electrical insulators, floor and wall tile, and art pottery; refractory materials includes clay fire brick, and other special refractories. Optical, chemical, art, and window glass form a fifth group; enameled iron for chemical and household use, a sixth; while the seventh study, cement and concrete, leads the student far into general chemistry.

COAT OF CONCRETE APPLIED TO TALL IRON STACK

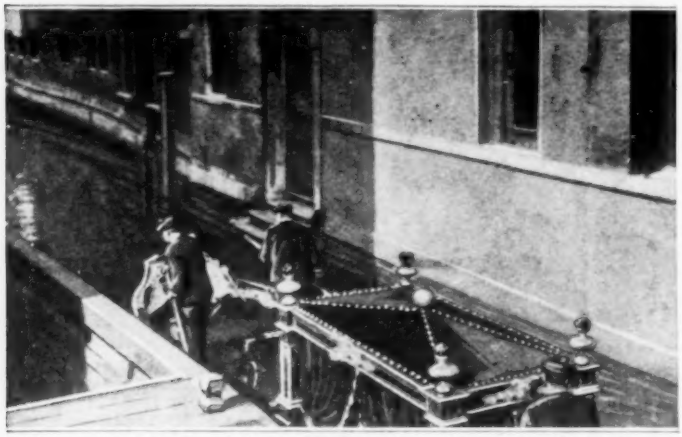
The skillful use of the cement gun recently enabled the operators of a large steel plant to repair in short order a great, worn-out stack, thus saving the price of a new one and the cost of a partial shut-down. The original chimney of iron stood 175 ft. high and was 9 ft. in average diameter; so the erection of staging ranked as the most difficult item in the work of repair. As the carpenters reared this framework, it was simply a matter of weaving the reinforcing network of vertical rods and triangle mesh, then shooting the concrete upon it. The coating was made 18 in. thick at the base, but was soon reduced to 6, and finally to 4 in. The crew of seven men was able to push the work along at the rate of 10 vertical feet a day.



The Renovated Chimney is Shown in Contrast with the Old at the Right. Concrete is Being Shot upon the Network at the Left with a Compressed-Air Gun

VENETIAN FUNERAL GONDOLAS SUGGEST BYGONE SPLENDOR

Though the gold-embroidered awnings and colored woodwork of the medieval gondolas have long been prohibited by Venetian law, a suggestion of the vanished pomp is still seen in the funeral barges that sometimes make their appearance. One of these is shown in the photograph, with carved and painted prow, and cabin richly curtained. Three gondoliers slowly propel it along a narrow waterway toward the Grand Canal, whose broad surface will bear the funeral procession to the church and cemetery.



Gliding toward the Grand Canal with This Funeral Barge, in All the Beauty of Painted Woodwork and Tasseled Hangings, the Imagination Slips Back to the Thirteenth Century, When the Nobles of Venice Vied to Make Their Gondolas Beautiful

GAS PRODUCER ON MOTOR CAR SUBSTITUTE FOR GASOLINE

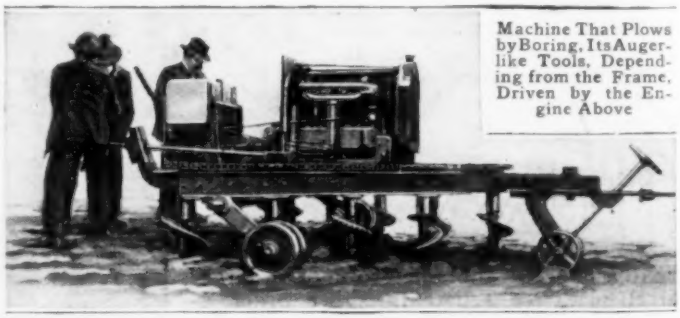
By installing a small producer-gas plant in a gasoline motor vehicle, and generating gas as it is needed, an English engineer has provided what appears to be an efficient substitute for gasoline. Hard coal, coke, or charcoal may be used for fuel, and the gas producer, as designed, weighs only about two per cent of the car and its load, and occupies little space. For truck use, it is claimed that hard coal at $12 a ton would be equivalent, in operating economy, to gasoline at 12 cents a gallon. The gas producer is small enough for installation on motorboats.

FARMERS ADD TO ARABLE LAND BY TERRACING HILLSIDES

Sloping fields and hillsides from which the good soil has been eroded by rushing drainage waters, leaving bare, uncultivable scars, are common on farms in all parts of the country. Many farmers are now reclaiming these barren patches, and so increasing their useful land by many acres, by terracing the slopes to hold back the water and stop the erosion. In this work both governmental and state departments are assisting. The terraces are arranged either in flat steps or low ridges across the slopes. Broad-base ridges are superseding the older narrow-base construction, on modern farms, because they are traversed more easily by cultivating machinery, and offer more resistance to the water.

CURIOUS FARMING IMPLEMENT PLOWS WITH HUGE AUGERS

By replacing the plow of traditional form with a group of huge augers that revolve on vertical shafts as the machine that carries them moves along, a California inventor has evolved a novel cultivating machine. Toothed edges on the auger blades assist in tearing up and pulverizing the soil, making the implement both a plow and a harrow. The vertical shafts are driven by chains from a gasoline engine on the wheeled frame, which is adjustable for varying the depth of the furrows.



Machine That Plows by Boring. Its Auger-like Tools, Depending from the Frame, Driven by the Engine Above

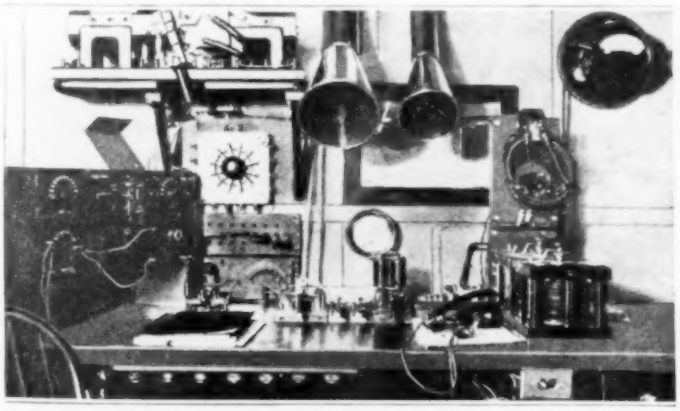
THE WARSHIP'S WIRELESS

By SAMUEL W. BEACH

A DREADNAUGHT'S wireless crew are a busy lot when at last it is a case of fight or sink. At the first blare of the bugle call, "All hands clear ship for action," an auxiliary station is manned either on the ship's bridge, in the conning tower, in the admiral's emergency cabin, or upon the quarterdeck, so that the warship's commander has at all times a wireless telegraph office literally at his heels. The operator manning the main set, in the wireless room three or four decks below the water line, is seated before at least two extremely large speaking tubes, each capable of being switched to different portions of the ship, by which he may be in constant vocal communication with the executive officers above. But this is considered far too slow, for in the pinch of battle every split second is vital. The main wireless room, however, remains as the sending station, the auxiliary operator flashing his message from above by means of a distant-control wire which, by actuating a powerful magnet fastened to the main key below, opens and closes that key just as though a human hand were doing it. The auxiliary operator attempts little receiving amid the crash of battle, although subsequent to the conflict he may cut in his apparatus to any overhead antenna.

Up-to-date battleships and larger cruisers are amply supplied with wireless aerials, so many that it would take several well-aimed enemy shots completely to sever their wireless communications. There is the big, main aerial strung between the tops of the military masts; others between outboard extremities of both starboard and port yardarms; one between the peak of the forward military mast and the bow; a twin brother between the top of the aft military mast and stern, while companion antennae may stretch downward toward decks from all four yardarm positions, forward, aft, starboard, and port. These aerials may all be placed in series or parallel, or may be used singly, in pairs, or in any manner, at the will of the operator, by throwing switches in the main wireless room.

When Enemy Seaplanes Spy About, the Gun That can Fire at Any Angle, and Wing a Plane Two Miles Overhead, Is the Best Defense



Equipment of a Modern Battleship Wireless Room: Distant-Control Magnet Key, Two Large Speaking Tubes, Switch for Connecting Auxiliary Stations, and Push-Button Starting Switch

While steaming within sight of other vessels of a fleet, a flagship does practically all official wireless work with distant ships and shore stations, relaying radiograms from and to its junior companions by means of the flag wigwag, the semaphore, the blinker, or the searchlight. This procedure minimizes chances of interference and delays incident to too

many ships' trying to telegraph simultaneously, and moreover, with but one ship's wireless being heard, hostile fleets have no means of knowing the strength of their enemy unless, indeed, they rely upon their seaplanes, and the latter couriers of the air have by no means an easy row to hoe these days when warships have guns that fire at any angle and can wing an aeroplane two miles straight above them.

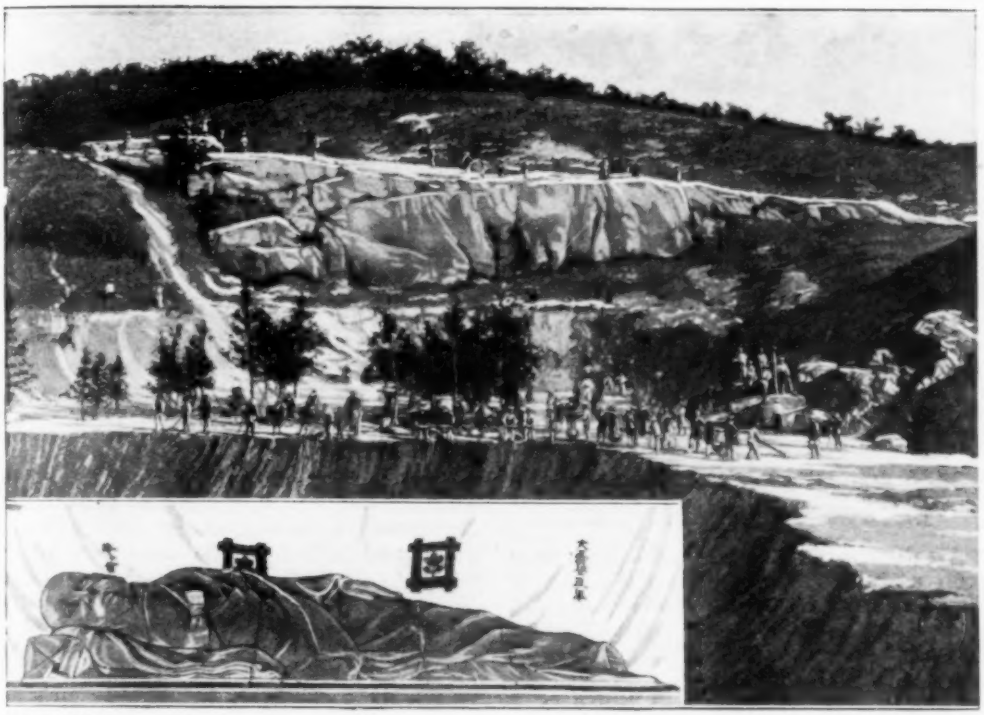
Nevertheless, although they may not so much as touch their own keys without specific permission from the chief radio officer aboard the mother ship, the telegraphers on junior vessels of a fleet at sea are not idle. To each is assigned a certain wave length, or set of wave lengths, to which their receiving apparatus must be attuned, so that very few are the dots and dashes that slip by a fleet unnoticed. This system is made especially necessary because, these days, new wireless stations are springing into being like mushrooms, both on land and sea, each differing in construction to some degree, and each churning the ether about them with wireless impulses of differing lengths. In war time this conglomeration of wave lengths may be practiced on purpose to deceive, elude, or mystify a belligerent, while during times of tranquillity it is necessary so that the ever-increasing volume of wireless business may be handled with proper dispatch. Of course, the ships, thus patiently listening in on many wave lengths, intercept a vast quantity of irrelevant stuff, but every now and then they may pull down a choice morsel from the sky that pays them well for their vigilance.

Should it be desired, a ship may listen in on two or three different wave lengths simultaneously, by connecting two or three receiving sets to the same antenna. This course, however, has a serious disadvantage in that, should either of the receiving operators change his adjustment in the slightest degree the better to hear some passing wave train, he automatically throws his mates out of kelter. This suggests the question why, with so many overhead wires to select from, each of these listeners do not use individual antennae. They may do so. But the effect of changing adjustments would be practically just as pronounced, for the reason that their antennae are too close together. Like a flock of chattering blackbirds holding communion among a lot of telegraph wires along some busy highway, wireless waves love to hop from wire to wire and back again, seemingly for no other reason than to see which perch they like best.

The Spreaders for Radio Antennae on the United States Battleship "Pennsylvania," as Seen Here, Indicate the Wireless Provision for War. A Switch Connects Any Desired Set of Antennae

HOT-WATER PIPE CORROSION ENDED BY EXCLUDING AIR

Steel and wrought-iron pipes of hot-water heating systems frequently become corroded to uselessness in seven or eight years. The action is especially noticeable where fresh water is admitted to the system in large quantities. The Bureau of Mines has found that water from which free air is excluded or removed loses its corrosive effect. A system provided with a storage tank containing expanded-steel lath, to which the water gave up its oxygen, showed no corrosion after three years of service; and open heater systems, in which the water is heated to 180° F. or more while at rest, thus expelling all its air, have served 10 years without corroding.



WIDE WORLD PHOTOS

The Giant Statue of Nichiren, the Founder of a Buddhist Sect in Japan, is Gradually Taking Form along the Rocky Hillside as the Sculptors Work, as Shown in the Large Picture. The Insert Below, of the Statue's Wood Model, Indicates Its Final Appearance

ENORMOUS JAPANESE STATUE CARVED IN HILLSIDE ROCK

The stone image of Nichiren, founder of a Buddhist sect, will stretch its reclining form along 240 ft. of rocky hillside when Japanese artists and artisans complete their work of sculpturing the solid-stone outcropping of a little island in the Inland Sea. The owner of the island is financing the undertaking. The new statue on which work was begun about 1913, as mentioned in the November issue of Popular Mechanics Magazine for that year, will exceed by 58 ft. the length of the Burma reclining Buddha.

CLOTHING DUMMY REHEARSES FOR MOTION-PICTURE STAR

By placing the burden of tedious rehearsal on the patient shoulders of "Nora, the Dummy," a famous motion-picture star is setting a precedent that is certain to be gratefully followed in other studios. Uncomplainingly, "Nora" takes the place of the winsome favorite, while lights are being adjusted, distances measured, and the "supers" drilled. Sitting comfortably beside the camera meanwhile, the star is able to offer sympathetic criticism and suggestion. Details settled, she

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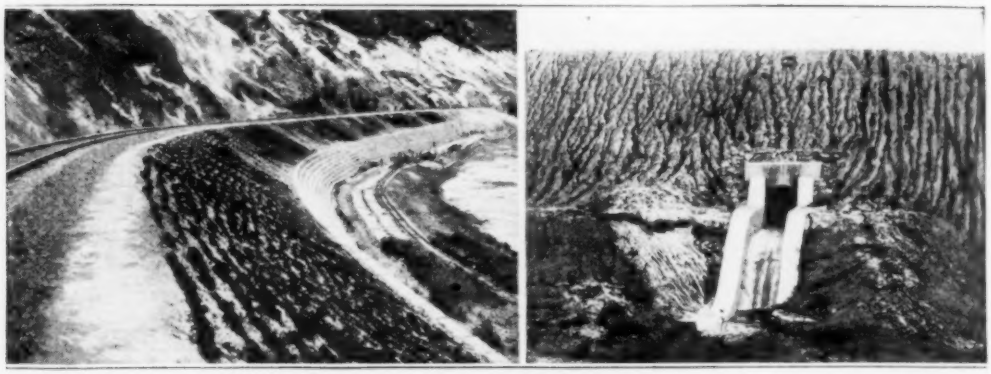
While Studio Lights are being Adjusted, Distances Measured, and "Supers" Drilled, This Clothing Dummy Impersonates the Star, Who Thus is Spared the Exhaustion of Too Much Rehearsal

steps before the camera, and portrays her rôle with unwearied vigor and enthusiasm.

¶ Plans for constructing portable wheat granaries have been prepared by the Department of Agriculture for free distribution to farmers.



The Curve on the Peking-Kalgan Railway, Pictured at the Left, has been Sown with Grass to Prevent Erosion. This Work, with the Elaborate Cut-and-Fitted Masonry at the Bottom, Is Possible Only in a Country Where Labor Costs Next to Nothing. The Terrific Erosive Force of the Torrential Rains is Illustrated by the Photograph of the Fill at the Right

BODY OF DELIVERY CAR BUILT LIKE PHONOGRAPH CASE

A delivery car that works for its owner even when standing still is the property of an enterprising music dealer in a large

The Body of This Delivery Car Resembles a Phonograph Case in Every Detail, Including the Crank Handle. The Car is Owned by a Dealer in Musical Supplies

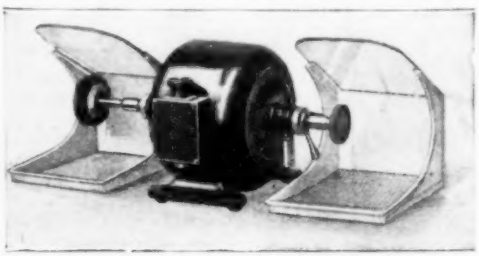
city. The car is a sure advertisement wherever it goes, as the body resembles, very appropriately, a large phonograph case. To make the likeness complete, the builders added every accustomed detail, even to the cranking handle.

HEAVY RAINS MENACE CHINESE RAILWAY BY EROSION

The spirit of "China for the Chinese" never had fuller expression than in the construction of the 120 difficult miles of the Peking-Kalgan Railway. It was a purely Chinese undertaking, being engineered and capitalized by natives, and is still notable for the peculiar country it traverses. One section, in particular, is subject to such torrential rainstorms that every precaution must be taken against washouts. The photographs on this page illustrate this necessity, one showing how the cheapness of native labor makes it possible to hold the soil by actual cultivation of the slopes, the second photograph picturing the erosion that resulted from a rainfall of 9 in. in eight hours.

GLASS-TOPPED SHIELDS MADE FOR DENTAL LATHES

The dentist owning a small laboratory lathe may now equip it with glass-topped shields, or splashers, which guard the grinding and buffing wheels, and so protect him from flying powder, and keep his workbench clean. In the course of the year, too, these guards will effect a considerable saving in gold and silver, as all the grindings fall, through a tray, to the bottom, where they may be salvaged.

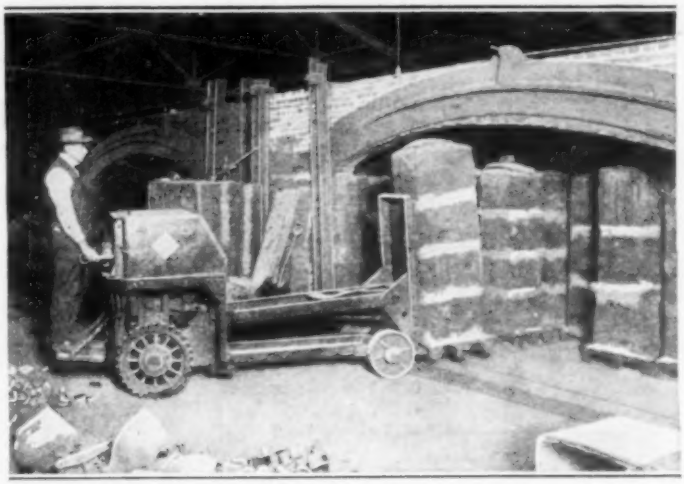


These Glass-Topped Shields Keep the Dentist's Workbench Clean, and will Eventually Save Him Money in Gold and Silver Grindings Recovered

The tops are made of glass, so that the work may be illuminated from all sides.

FORK MAKES ELECTRIC TRUCK FACILE FURNACE CHARGER

The use of a huge "fork" with an ordinary electric truck has solved for a manufacturer of malleable cast iron one of his most perplexing factory problems, namely, the removal of the hot clay "pots" from the crowded interior of a roofed-over treating furnace. The operation, once tedious, is now a matter of minutes. When a furnace is opened, the truckman runs his fork beneath the stool on which rests one of the pots. Closing a switch, a separate motor raises the two-ton object clear of the floor, and tilts it back as on a stevedore's hand truck. The trip to the "knockdown" floor, where the castings are removed from the pots, is then made in two minutes or less. To charge the furnace the operation is simply reversed. The truck's rear wheels are equipped with steel "herringbone" tires, as best qualified for such work.

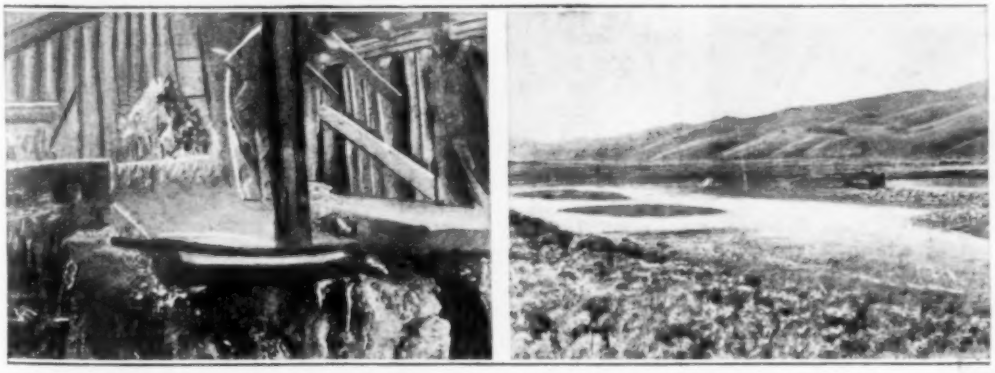


The Clay "Pots" Containing the Iron Castings are Here being Placed in the Furnace in Preparation for a "Heat." This Work is Done with Deftness by the Electric Truck, in Front of Which Extends the Motor-Operated "Fork"

ISOLATED RANCHMEN OPERATE OWN SALT VATS

Far distant from the railroad, like many another western point, Star Valley, Wyo., is nevertheless the home of several ranchmen. These carry all their supplies overland by wagon; all, that is, but salt for their cattle. This nature has provided in the form of salt springs in the surrounding hills. Near the springs the ranchers have built a hut, and therein erected their own crude salt vats, or evaporators. These resemble mortar boxes, but have metal bottoms, beneath which fires are kept burning. When all the water has been evaporated, the salt is shoveled out, and the vats refilled from the springs. By hastening the process, the ranchmen obtain a finer grade of salt for table use.

¶ Foreign students of Americanization classes, regularly held at a New Jersey shipyard, are receiving their naturalization papers as diplomas on graduation.



Water from the Salt Springs is Brought to the Little Cabin Seen at the Right. Here It is Boiled in the Crude Vats, Shown at the Left, Until the Liquid has Evaporated. The Solid is Then Shoveled Out and Taken to the Salt-Hungry Herds of Cattle. By Thus Operating Their Own Vats, the Ranchmen are Saved the Necessity of Hauling Salt from the Railroad, Many Miles Away

FLORAL STREET LIGHTS CARRY OUT ROSE-FESTIVAL SPIRIT

Electrically lighted red, yellow, and pink roses for street lamps were a striking novelty of the latest rose festival in Portland, Ore. The big counterfeit flowers were made of stamped metal, the outer circle of petals measuring 30 in. across, and a 1,000-watt lamp forming the center. The luminous blossoms were mounted on stems made of tree branches, with two other stems wired on, carrying five leaves each. The leaves, 9 in. long and 6 in. wide, also were pressed out of metal.

FALLING PENDULUM REVEALS PAPER'S TEARING STRENGTH

A paper-testing machine that gives promise of real commercial value is to be credited to the Forest Products Laboratory of Wisconsin. In detail, the instrument consists of a horizontal axle, which is mounted on ball bearings, and carries on one end a grooved wheel, on the other end a fixed lever arm with adjustable pendulum weight. Over the grooved wheel runs a cord, one end of which is attached to a paper clip, the other to a brass cylinder of equal weight. To run a test on paper stock submitted, one edge of a sample, five inches square, is clamped horizontally below the wheel. A central "tongue," an inch and a half wide, is left free, however, and to this the paper clip is attached. Raising the lever arm high to the left, the operator notes its exact position, then releases it. Falling, it tears the paper, then swings a certain distance to the right. Noting this second position, the operator is able to compute the work done in tearing the paper. Three or four sheets are tested at a time, and the mean result taken as the true tearing strength.

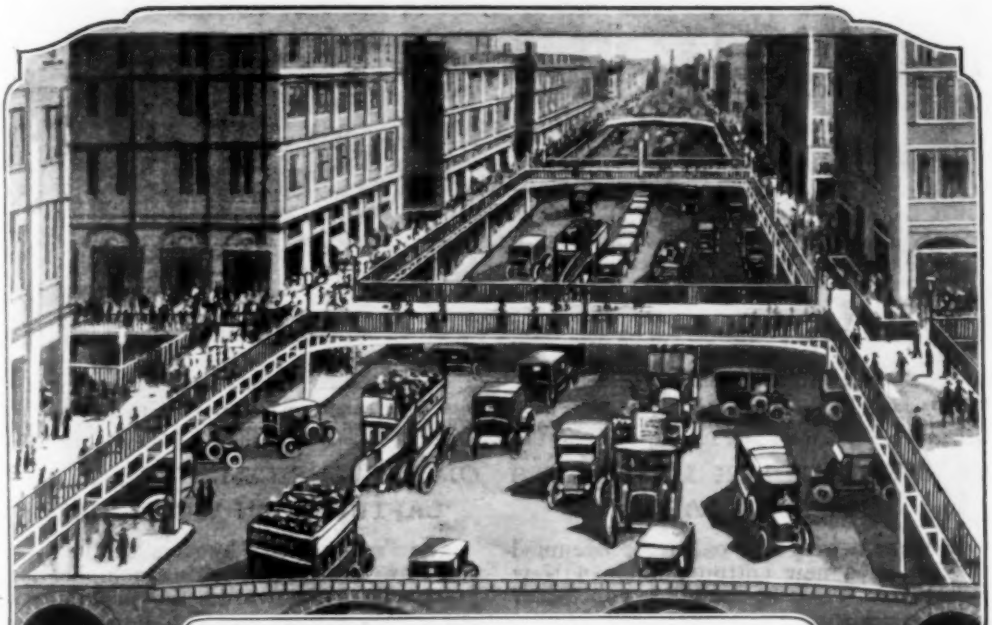
MECHANICAL BOTTLE WASHER OPERATED BY HAND

Dairymen whose trade is too small to warrant the use of a power bottle washer no doubt will approve of a hand-operated cleaning device now on the market. On one end of a spiral-grooved rod is attached a brush, which is revolved inside a bottle when the latter is placed over it and pressure applied to force the shaft through a fixed bearing that is supplied with a ridge to engage the groove. When the pressure is removed, a spring returns the rod to its first position, the brush being turned in the opposite direction during this operation.

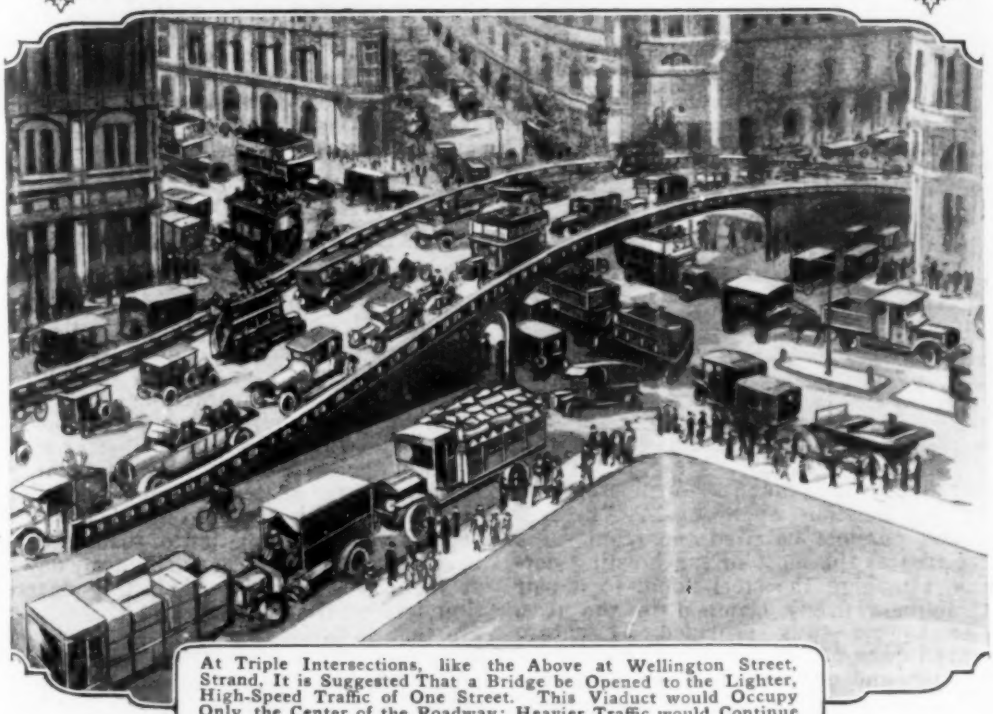
FALSE TEETH MOVE NATURALLY WHEN MOUNTED ON NEW STAND

The art of constructing artificial teeth has made long strides during the last decade; and it steps forward once again with the recent invention of the "anatomical articulator" shown in the photograph. Mounting a set of teeth on this stand, the dentist can study the grinding power of the teeth and the effects of jaw motion, at his convenience. Defects in a set of teeth are thus revealed with a minimum of discomfort to the patient.

ODD PLANS WOULD RELIEVE TRAFFIC CONGESTION

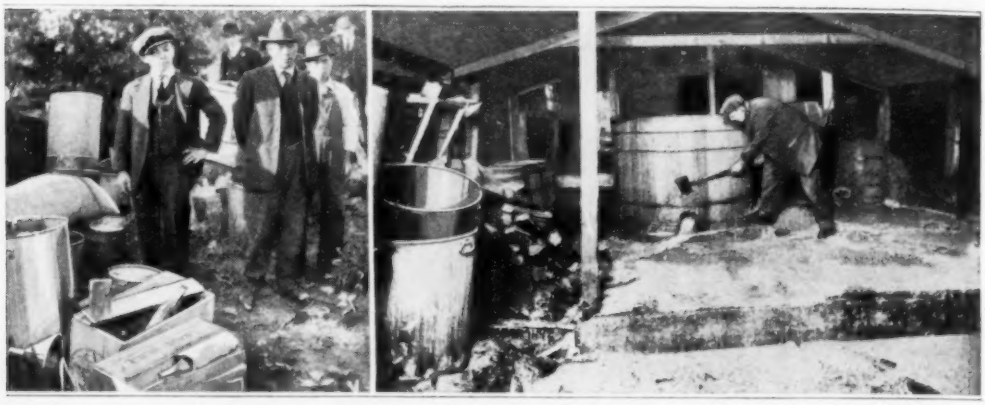


Perplexed by the Growing Congestion of Foot and Vehicular Traffic on London Streets, the City is Now Considering Many Suggestions for Its Abatement. Two of the Most Promising Plans are Shown on This Page. The Elevated Footways, Above, are Reached from the Street by Moving Stairways. Shops Open on Both Levels



At Triple Intersections, like the Above at Wellington Street, Strand, It is Suggested That a Bridge be Opened to the Lighter, High-Speed Traffic of One Street. This Viaduct would Occupy Only the Center of the Roadway; Heavier Traffic would Continue to Use the Lower Levels at Both Sides

FROM THE SPHERE, LONDON, COPYRIGHT BY THE NEW YORK HERALD



The Operators of the Illicit Rice-Liquor Plant and Some of Their Paraphernalia are Seen at the Left. At the Right, a Government Officer is Wrecking a 500-Gallon Wooden Tank Containing Mash Made from Fermenting Rice Mixed with Raisins, Corn, and Yeast. Other Capacious Tubs and Barrels Are in Evidence

TREE AS DERRICK MAST SAVES BUILDING LABOR

Because a grove of oak trees occupied the site of a new cotton mill, in a New Hampshire city, the building contractor

Live Tree Used as a Derrick Mast in Building Operations: The Presence of a Grove of Oaks on the Building Site Saved the Contractor Much Labor

was able to save much labor in preparing for his hoisting operations. Wherever it was possible he used the trunk of a live tree as the mast of the hoisting derrick, attaching the steel boom to a pair of timbers firmly clamped to the tree. The towers thus provided by nature proved quite as reliable as any that could be built, and certainly had the advantage in point of cost, as well as in speed of preparation.

ORIENTAL RICE-LIQUOR PLANT CAPTURED ON WEST COAST

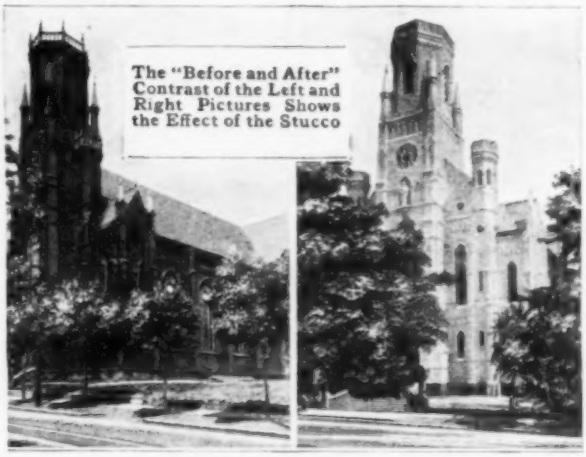
The "moonshine" hunters of the west coast are contending with a complication practically unknown to the prohibition-law forces elsewhere. The Japanese distillers and fermenters of rice are their particular problem. The most ambitious plant of this illicit species yet discovered was captured recently in Oregon, and had a daily capacity of 75 gal. of highly intoxicating beverage, which was being shipped out in bottles labeled "grape juice." The government officers destroyed a wooden tank which contained 500 gal. of mash made of fermenting rice, corn, raisins, and yeast.

CITY WATER AND TWO CREEKS STOP FIRE IN GOLD MINE

All the pumps available, assisted by a newly blasted subterranean drainage tunnel, have been engaged for six weeks in drawing water out of a famous South Dakota gold mine. Meanwhile, of course, the mine and all its workers are idle. The flooding, costly as it has been, was not accidental; two creeks and the water supply of a good-sized town were deliberately turned into the shaft. Fire in a gold mine is unusual, but it occurred in this case because a vast accumulation of disused timbers had been stored in a drift, away down at the 2,200-ft. level. A blasting operation ignited the timbers, and the raging fire that followed was only extinguished when the mine had been completely flooded. Working day and night, it is estimated that the task of drying out the mine will take another two months.

OLD CHURCH STUCCOED HAS EFFECT OF MARBLE

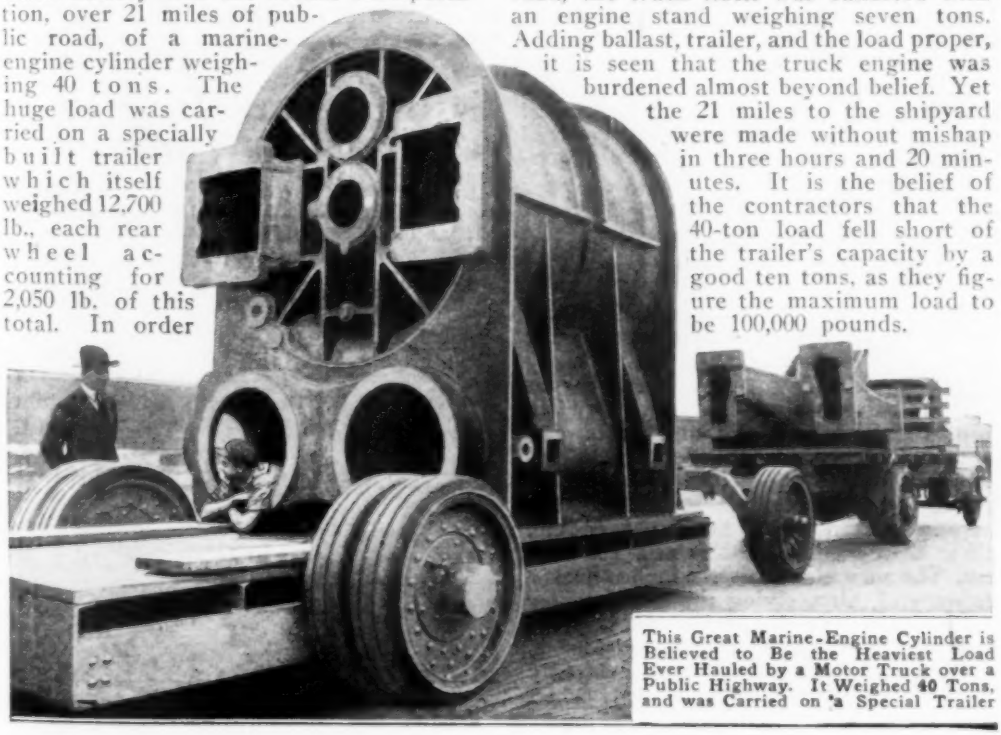
Stucco as a transforming and beautifying agent for frame structures is familiar to all, but stuccoing a brick building has some novel aspects. Recently, in an Ohio city, a big brick church of considerable architectural beauty, was so treated with surprisingly attractive results. After cleaning the old brickwork and notching out the joints, a mortar of equal parts of sand and cement was applied. A concrete of two parts sand and one part cement was then laid on with trowels and shaped to form a rough block effect. The whole surface was finished with a coat of white cement paint, and the joints painted in with lampblack and cement. In its new garb, the church strikingly resembles a structure of marble masonry, and has taken on an added dignity and beauty with its new dress. The direct adhesion of the stucco to the brick surface made the process simpler in this case than coating a frame building, which would have necessitated the use of lathing.



The "Before and After" Contrast of the Left and Right Pictures Shows the Effect of the Stucco

MOTOR TRUCK HAULS 40-TON CASTING 21 MILES

A feat with but few parallels in motor-truck history was the recent transportation, over 21 miles of public road, of a marine-engine cylinder weighing 40 tons. The huge load was carried on a specially built trailer which itself weighed 12,700 lb., each rear wheel accounting for 2,050 lb. of this total. In order that the driving wheels might grip the road, the truck itself was ballasted with an engine stand weighing seven tons. Adding ballast, trailer, and the load proper, it is seen that the truck engine was burdened almost beyond belief. Yet the 21 miles to the shipyard were made without mishap in three hours and 20 minutes. It is the belief of the contractors that the 40-ton load fell short of the trailer's capacity by a good ten tons, as they figure the maximum load to be 100,000 pounds.



This Great Marine-Engine Cylinder is Believed to Be the Heaviest Load Ever Hauled by a Motor Truck over a Public Highway. It Weighed 40 Tons, and was Carried on a Special Trailer

MAKESHIFT BAND INSTRUMENTS USED BY EASTERN PLAYERS

Shoestrings, tin cans, and other odd materials, were assembled to form musical instruments for an orchestra recruited from an organization of Indo-Chinese laborers, attached to the American expeditionary forces in France during the war. Though the weird noises made by the strangely equipped band were far from pleasing to western ears, they appeared to satisfy the Oriental players and their comrades, who proved appreciative audiences at all of the concerts.

With Instruments Made of Shoestrings and Tin Cans, These Indo-Chinese Laborers Gave Unique Concerts in France during the World War

LARGER MOTOR BUSSES FOR LONDON STREETS

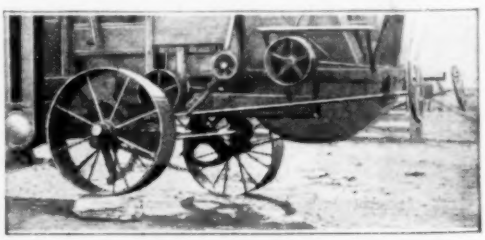
Motor busses not unlike small Pullman cars will soon be traveling the streets of London, if plans submitted are officially approved. The new type is much larger than the old, seating 22 passengers on the upholstered seats within and 24 on the roof, as compared with the present capacity of 36. Much of the gain in passenger space is effected by placing the driver's seat to the right of the engine, rather than behind it, as is now the custom. The new chassis is six inches nearer the ground, also, giving the car a center of gravity so low that an upset is practically impossible. As no provision is made for "straphanging," it is evidently the intention to take on fares only when seats are vacant.

ELECTRIC ARC USED TO MAKE SYNTHETIC AMMONIA

Though long known as a practical laboratory experiment, the electrical synthesis of ammonia has only recently been proved a commercial possibility. The chemists find that hydrogen and nitrogen combine in the presence of an electric arc to form ammonia, in quantities varying with the gas pressure and the metal used for electrodes. Theoretically, the mixture should be proportioned according to the formula, NH_3, but as a matter of fact, the experimenters find that the elements are not equally activated by the arc. They suggest, in consequence, that an excess of nitrogen be used. On the whole, the action is not yet well explained, although as a matter of simple conjecture, it is thought that the molecules of the two gases are dissociated in the region of the arc into their constituent atoms, making combination easy.

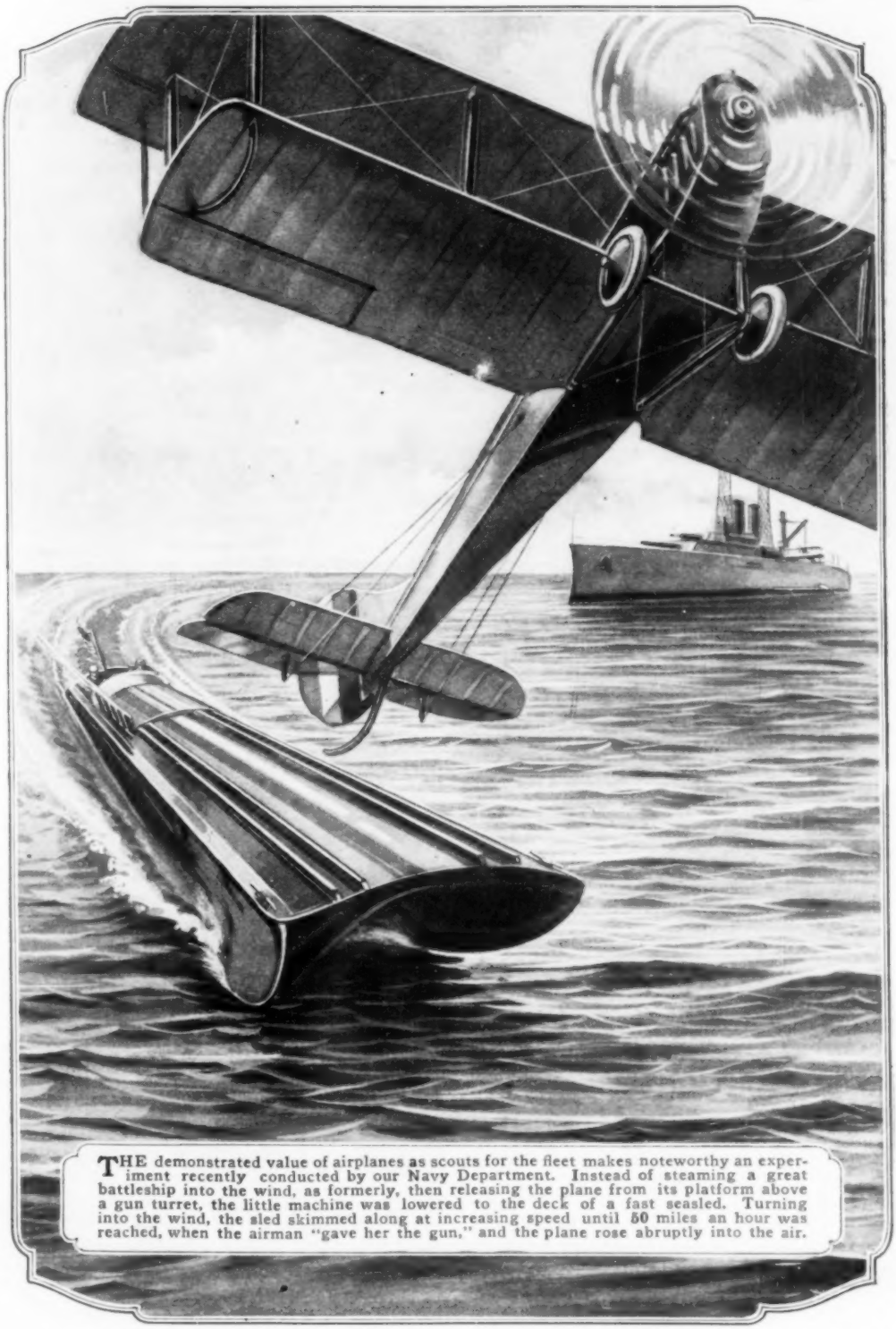
GRAIN SEPARATOR MADE LEVEL BY ADJUSTING REAR WHEELS

Digging a hole under one wheel and blocking up another with a bit of wood or stone, is the ordinary method of leveling a grain separator on uneven ground, so all the grain will not work to one side. A western inventor has done away with this trouble by hanging the rear wheels of the separator on an eccentric mounting, adjustable for height by means of a toothed arc and a pinion. Either pinion may be turned by a handwheel at the rear.

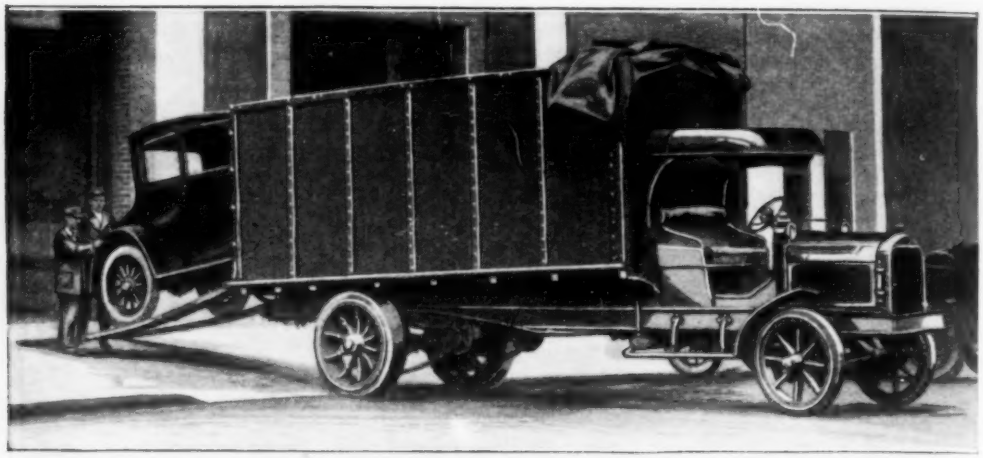


Grain Separator Made Level on Uneven Ground by Adjusting Rear Wheels with Handwheels at Back

NAVY AIRPLANE SHOT INTO AIR BY SEASLED



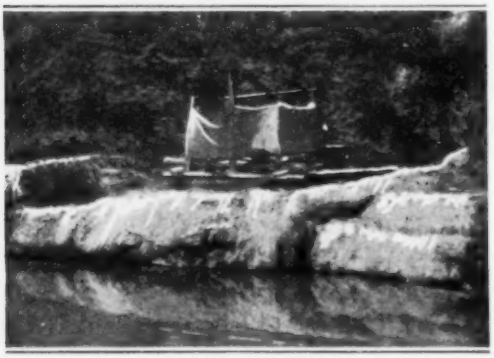
THE demonstrated value of airplanes as scouts for the fleet makes noteworthy an experiment recently conducted by our Navy Department. Instead of steaming a great battleship into the wind, as formerly, then releasing the plane from its platform above a gun turret, the little machine was lowered to the deck of a fast seasled. Turning into the wind, the sled skimmed along at increasing speed until 50 miles an hour was reached, when the airman "gave her the gun," and the plane rose abruptly into the air.



Great Motor Trucks like the One Above are being Used by One Express Company to Deliver, about the City, Automobiles Shipped in Its Charge

SPRING SUPPLIES HOT WATER FOR OPEN-AIR BATHHOUSE

In his desire to partake of the healing benefits of this natural hot spring, a traveler in Idaho has erected a crude bathhouse. The tub consists of a box, about 8 by 10 ft., which is sunk into the



An Ideal Location for This Somewhat Primitive Bathhouse Is the Natural Hot Spring on the Bank of an Idaho River

deposit and is continually provided with fresh water from the spring by means of a trough. Stakes, upon which canvas sides are tacked, and a few crossed logs complete the structure. Protection from the sun and wind is thus assured, although in the secluded location there is no need for privacy or convention.

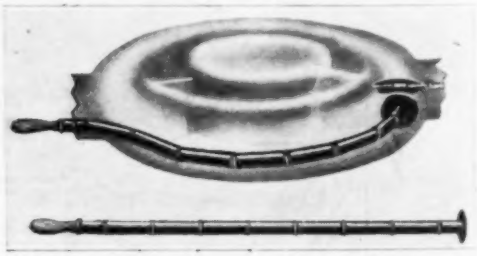
¶ Not only can British submarines spout like a whale, but they can send messages in the Morse code by staccato jets of water. They used this means in the war to signal their identity to friendly ships.

EXPRESS COMPANY DELIVERS AUTOS IN SPECIAL TRUCK

Unprecedented demand for pleasure cars has resulted in such heavy shipments of automobiles that many are shipped by express, and delivered like ordinary packages. To carry these huge "bundles" from freight yard to destination, one express company has bought several five-ton motor trucks with bodies of special design. Each is open at the top and end, and easily holds a roadster or touring car.

JOINTED FURNACE ROD CLEANS ALL SIDES OF FLUES

By the simple expedient of making a furnace-cleaning rod in short sections hinged together, a Michigan manufacturer produces a tool that will reach and scrape clean all sides of the flues in a hot-air heating plant. As the rod is



The "X-Ray" View Above Shows the Cleaning Rod in a Curved Flue. Below It is Seen Straightened

flexible only in one direction, and rigid in the other, its action is easily controlled by a twist of the handle. Extra links can be added if a longer rod is needed.

SURPRISING AMOUNT OF WOOD IN MODERN STEEL BRIDGE

Timber is popularly supposed to be completely nonessential to the construction of a modern steel and concrete bridge. Just how far this idea deviates from fact is well illustrated in the case of a new 16-span steel bridge with concrete-walled approaches, now being built near Fort Smith, Ark., across the Arkansas River. For the stagings and temporary trestle, 17 carloads—more than 300,000 ft.—of lumber were ordered before construction could be started. Then a small box plant had to be set up to make the concrete forms. Finally, the whole bridge floor is to be paved with creosoted-wood blocks. It is likely that over 1,000,000 ft. of lumber will be required before this steel bridge is completed.

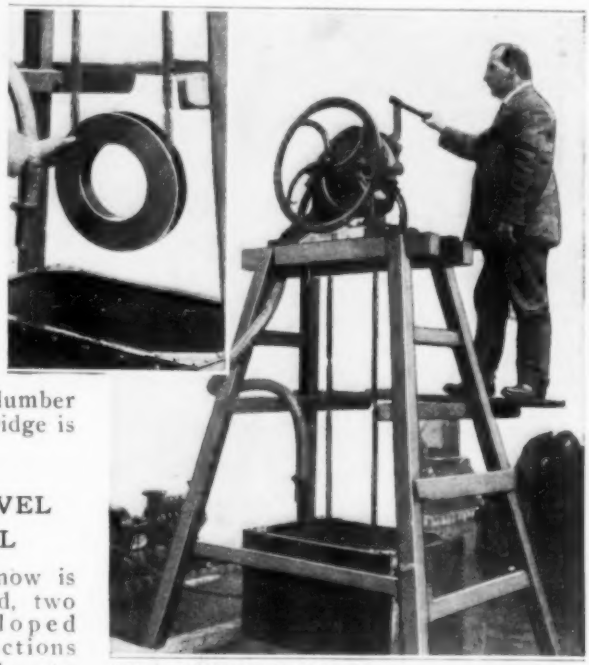
SNOW PUSHER AND SHOVEL COMBINED IN ONE TOOL

Realizing that light, feathery snow is more easily pushed than shoveled, two Ohio inventors have developed a tool in which both functions are combined. Two rods attached to the shovel blade normally lie flat, but pulling a lever on the handle locks them into position as braces, and turns the blade almost at right angles, ready for pushing. A detachable wing for the pusher deflects the snow to one side.

By Turning the Lever on Its Handle, the Snow Shovel is Changed into the Snow Pusher Seen in the Circular Insert

PECULIAR PUMP HOLDS WATER BY CAPILLARY ATTRACTION

Calmly ignoring all the customary rules of pump design, an English inventor has made a pump without cylinders or buckets which, in a hand-operated model, lifts 1,000 gal. of water an hour to a height of 300 ft. The mechanism consists merely of an endless cable made up of sections of chain covered with helixes of metal, like slightly open coil springs. A heavy idler pulley holds the lower end of the loop submerged, and an inclosed pulley at the upper end is equipped with crank and flywheel. Capillary attraction holds the water in the meshes of the helix as it is drawn up, and it is discharged only when the coils turn over at the top. A discharge spout in the casing receives the liberated water.



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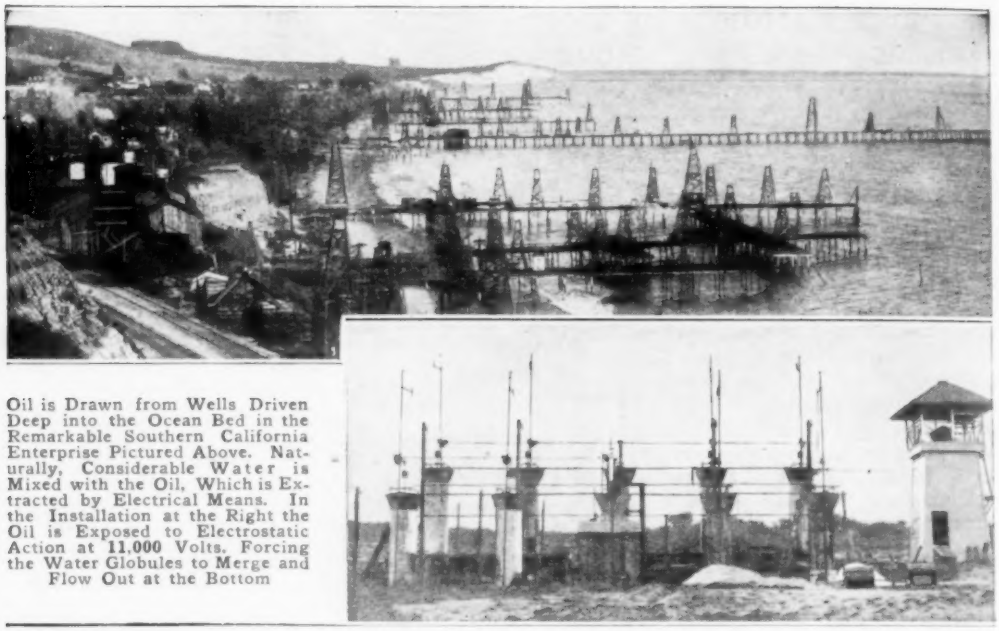
Close Inspection of the Cable Hanging in the Well Reveals Its Construction of Chains and Coils. The Insert Shows the Idler at the Lower End

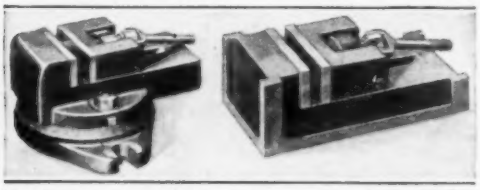
¶ Because of a dearth of carpenters, farmers in central Iowa are coöperating in the erection of needed buildings, with the aid of the county agent, thus reverting to the old system of mutual assistance in barn raising. After gaining experience with poultry houses, they will proceed to larger enterprises.



Oil is Drawn from Wells Driven Deep into the Ocean Bed in the Remarkable Southern California Enterprise Pictured Above. Naturally, Considerable Water is Mixed with the Oil, Which is Extracted by Electrical Means. In the Installation at the Right the Oil is Exposed to Electrostatic Action at 11,000 Volts, Forcing the Water Globules to Merge and Flow Out at the Bottom

VISE OF UNUSUAL FORM IS TOOL OF MANY USES

Machinists' vises, however improved by new design, usually depart little from the conventional form. One now made in New York, however, is distinguished by several novel features. The plain model is built low, with a quick-sliding jaw and a powerful grip, and the jaws remain parallel under severe strain. The body, a single casting, is finished square on five of its six sides, so that the work it holds can be accurately machined without removing or changing it. Another model is built with a protractor base, permitting the work to be turned accurately at any angle.



The Vise at the Left Has a Protractor Base; the One at the Right is Finished Square on Five Sides

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¶A mobile shoe-repair unit is being developed experimentally by the Army Department. If a success, the next revision of the tables of organization may add one of these units, with its two auto trucks, to each army division.

WATER EXTRACTED FROM OIL BY ELECTRICAL PROCESS

Oil as it comes from the wells contains a certain amount of water in suspension, which must be removed. The quantity reaches a maximum in the product of those remarkable oil wells driven in the bottom of the sea, and along the beach, in some parts of southern California. An electrical method of extracting the water has recently been developed, and is proving highly efficient, delivering a clear oil with little attention and at a low cost figure. The oil is passed between two plates which are terminals for a single-phase alternating current at about 11,000 volts. The process is electrostatic, the inductively charged water globules, mutually attracted, rapidly combining and settling to the bottom.

REBUILD STEAMER "LEVIATHAN" FOR PASSENGER SERVICE

The huge steamship "Leviathan," once of the German merchant marine, is being rebuilt for American passenger service at an expense estimated at about two million dollars. Oil burners are to be installed, among other improvements, and new machinery will replace that destroyed by the former crew. Several months will be required to complete the work of rehabilitation.

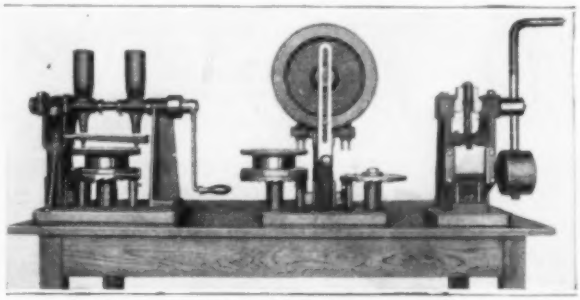
SEASIDE ROAD PAVED WITH GOLD-BEARING SAND

Black sand from the bottom of the ocean is being used as a fill in the paving of a seaside highway on the west coast. Besides an unusual amount of iron and mica, this sand has been found to contain gold to the extent of about $2.50 per cubic yard. There is, however, no practical method of extracting the precious metal, so the rich dirt is useful only for common filling. The dredging of the sand from the sea bottom, which is done with a pump, serves a double purpose. While facilitating the extension of the highway to the new width of 35 ft., it is also cutting and deepening a useful channel in the bay.

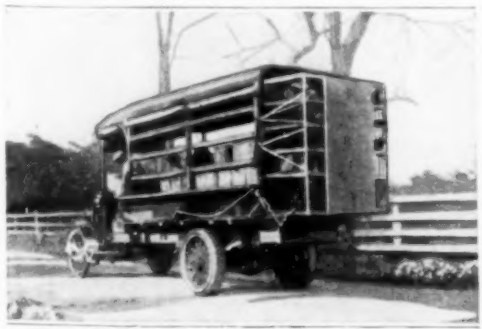
The Dredge in the Distance is Pumping Black Gold-Bearing Sand and Water from the Bay in the Foreground, to be Used for the Unromantic Purpose of Widening the Highway. Extravagant as the Enterprise Appears, No Practical Method has been Found for Recovering the Gold, and the Sand Is Good Only for Filling

SHELLS RELOADED WITH SIMPLE MACHINERY

Three simple hand-operated machines, devised by the Ordnance Department, promise greatly to increase the popularity of target practice, by reducing its cost. This they do by reloading used ball-cartridge shells at the rate of 2,500 to 3,000 an hour. One machine resizes the shells with vertically moving dies, and removes the used primer caps. A second device feeds powder into the empty shells, an adjustable slot in the shaft measuring the charges. The third machine seats the new bullets and priming caps by means of vertical plungers, the shells being carried by horizontally revolving drums, fed by a ratchet arrangement underneath.



At the Left Is the Bullet and Priming Cap Seater; in the Center, the Powder Charger, and, at the Right, the Resizer and Decapper



Placed on the Lowered Tail Gate, This Portable Chicken Coop Occupies Space Normally Wasted

CHICKEN-COOP ATTACHMENT ADDS TO TRUCK CAPACITY

A Kentucky produce dealer is so pleased with the portable chicken coop he recently built that he is planning to make one for each of his motor trucks. The coop is a five-story cage of wood and steel, with a central door for each floor. Having loaded one of his trucks, the dealer has the coop set upon the lowered tail gate and lashed in place. In this way truck capacity is increased decidedly. The coop weighs little, and occupies space that is usually wasted.

MECHANICAL LOADER DELIVERS GRAVEL IN THREE GRADES

Extraction of gravel from the pit is considerably accelerated and simplified by

The Screen at the Top Catches the Coarsest Gravel; a Second Screen Deposits Intermediate Gravel in the Hopper, While Fine Gravel Falls from the Spout

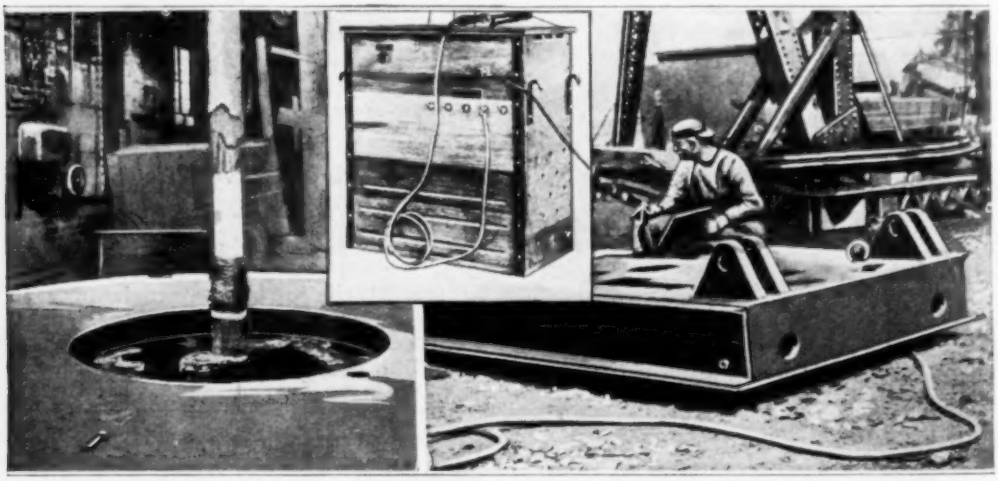
an engine-driven loader and screener now manufactured. Passing up the bucket conveyor to the top of this machine, the gravel is thrown upon a large-mesh screen which separates the largest stuff from the rest, and sends it directly down a loading chute. The finer material falls upon a second rocking screen which divides it into ordinary gravel and sand. The former is held in a hopper, while the latter falls to the ground.

COLOR SCREENS IN TELESCOPE SHOW CONTRASTING IMAGES

By a peculiar use of color screens between the objective and eyepiece of his telescope, an English astronomer is able to see two images, in sharply contrasting colors, when he points the instrument at a heavenly body. Inspecting this double image, he finds his attention attracted to planetary details hitherto unnoticed. The little pieces of colored glass are semicircular in shape, and are placed about six inches beyond the eyepiece, with diameters touching, but with planes not quite parallel. Peering through the eyepiece, the astronomer consequently sees a disk with halves contrastingly colored; and, as the halves are not in the same plane, he sees the planet twice. If it is not in the center of the objective, one disk will receive more light than the other. Knowing this, the astronomer is able to regulate the relative intensity of the contrasting images at will, by moving the object from side to side, and thus attain a more perfect view.

COMPACT THREE-PHASE WELDER HANDLES HEAVY WORK

Where three-phase electric current is available, an arc-welding outfit now offered for heavy repair work claims many advantages of convenience and compactness. It consists of a transformer in a wood case, occupying only 32 by 18-in. floor space, and taking current at either 220 or 440 volts, allowing the use of thin leading-in wires. One secondary termi-

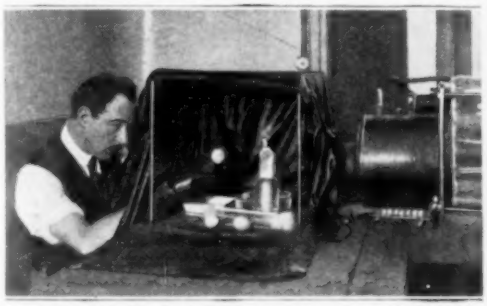


The Three-Phase Welding Transformer in the Central Insert Repaired the Five-Inch Cast-Iron Shaft at the Left, and Restored to Good Order a Huge Cracked Bed Plate by the Operation Seen at the Right

nal connects by a cable with the metal to be welded. The other has five connecting screws for varying the current strength, and its cable terminates in a clamp for holding the carbon or metal electrode. There is a push switch for the primary circuit, but no other circuit breakers, as withdrawing the arc stops the current flow. A five-inch shaft and a massive iron base plate were successfully repaired with this set.

CHICKS REARED IN BACTERIA-PROOF INCUBATOR

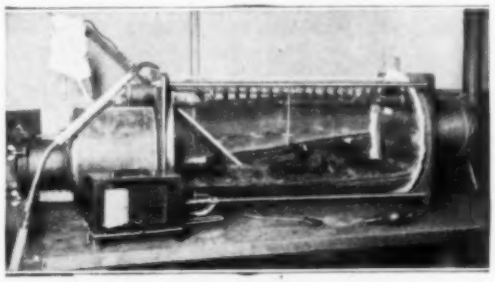
Upon the old question of whether or not vertebrates can live without the companionship of the "benevolent" bacteria which ordinarily populate their digestive tract, penetrating light is thrown by the recent experiments of a French bacteriologist. Believing that the affirmative is true, he has observed painstakingly the growth of chickens hatched and reared under sterile conditions. He is able to report that his bacterialess subjects have developed vigorously, and at maturity



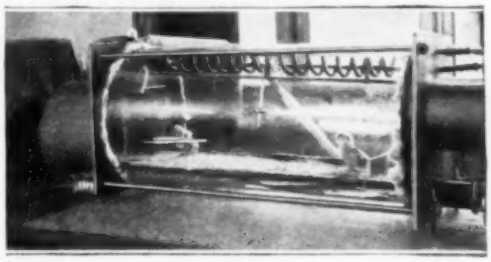
One Side of the Cubical Antechamber has been Raised Here to Show How the Eggs are Washed in Antiseptic before Introduction into the Incubator

have actually displayed unusual resistance to cold, thirst, and hunger. Placed among untreated fowl, they have easily withstood the inroads of common bacteria.

The value of these results to pathology is not safely predicted at this time; yet the experiments are noteworthy, if for nothing else than the ingenious and original apparatus devised for their execution. As laid out on the laboratory table, there is first a cubical antechamber, about 37 in. on each edge. Here the scientist washes the eggs in antiseptic solution, and performs other manual operations. Communicating with this antechamber by an air-tight door is the cylindrical brass incubator, about 15 in. long, where gas jets keep the eggs at constant temperature until they hatch. Separated from this chamber by a cloth curtain is a likewise air-tight cylinder of glass, 50 in. long, where

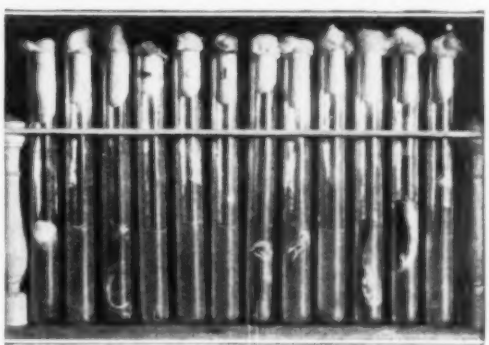


Young Guinea Pigs are being Raised Above, under Conditions Similar to Those Described for Chickens. The Clamped Door of the Incubator Excludes All but Filtered Air from the Pipe at the Right



The Refrigerating Coil is Here Seen Clearly at the Top of the Glass Cylinder. Beneath Hangs the Trough Which Catches the Drip Water and Conveys It to the Pampered Chicks

the chicks live until their transfer to an unprotected chicken yard, or their death by chloroform at the end of a determined period. It is here, of course, that most elaborate precautions are taken to exclude invading bacteria. Two substances, alone, are admitted: filtered air and aseptic food. Water is condensed from the air by a refrigerating coil, which drops it into an inclined gutter, and thence into the drinking tub within reach of the chicks.

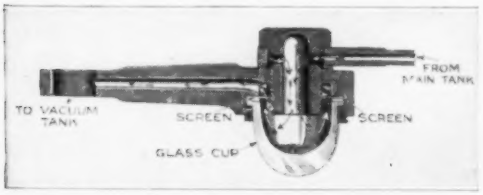


PHOTOS COPYRIGHT, KADEL & HERBERT

When the Subjects of the Experiments have Attained the Desired Growth, Some are Chloroformed, Dismembered, and Placed in Culture Tubes Where Bacteria, if Present, will be Revealed

GLASS TRAP IN GASOLINE FILTER CATCHES DIRT

To the autoist, curious to know how much dirt and water he buys with his gasoline, is recommended a new filtering attachment of unusual design. Placed between the main tank and the vacuum tank, it guides the gasoline up through a brass screen of fine mesh. Impurities separated from the gasoline in this way fall to the bottom of a glass trap. When too much dirt and water are seen in this transparent cup, it is removed for cleaning. The removal of this trap, incidentally and obviously, locks the car and protects it against theft.



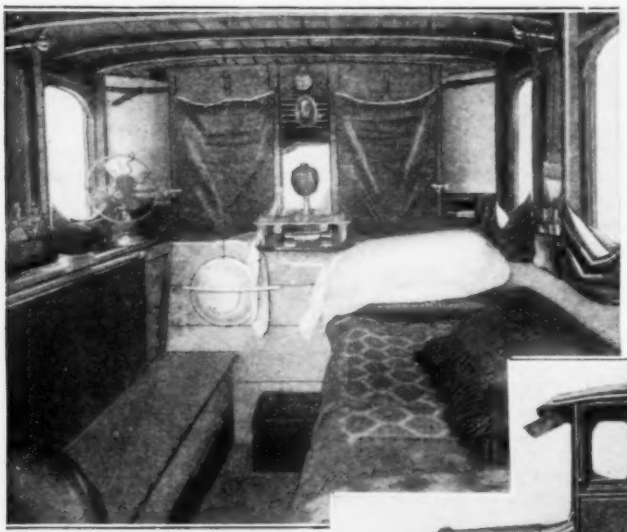
With This Filter Screwed to the Intake of His Vacuum Tank, the Motorist can Find by a Glance at the Glass Cup Just How Much Dirt and Water He has Bought with His Gasoline

COMPARE SAPWOOD STRENGTH WITH THAT OF HEARTWOOD

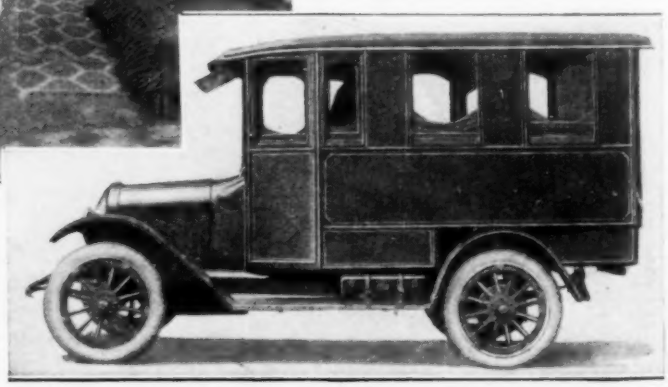
Common belief that sapwood is mechanically weaker than heartwood is refuted by the results of over 300,000 tests made by the U. S. Forest Products Laboratory. It is demonstrated that no perceptible change in mechanical properties takes place when sapwood changes to heartwood. In most native woods, however, the sapwood is more readily attacked by decay when not protected by preservatives. Such decay naturally is apt to weaken the wood, especially its resistance to shock, and shorten its life.

ITINERANT LIVING QUARTERS ON SMALL TRUCK

That a large chassis is not necessary for the construction of motorized living quarters has been demonstrated by a Texas man, who has built a good-sized room on the frame of a small truck, the whole weighing but 3,060 lb. There are 10 windows, copper-screened and silk-curtained, a sleeping couch and comfortable seats, a writing table, and a book rack. Special means are provided for carrying fresh food, and there is storage space for provisions, utensils, and other necessities. An alcohol lamp is used for cooking. In the corners are two water tanks of 4½-gal. capacity. Electric lights and a fan increase the homelike effect. Small as this itinerant home is, its owner regards it as far more comfortable than many hotels.



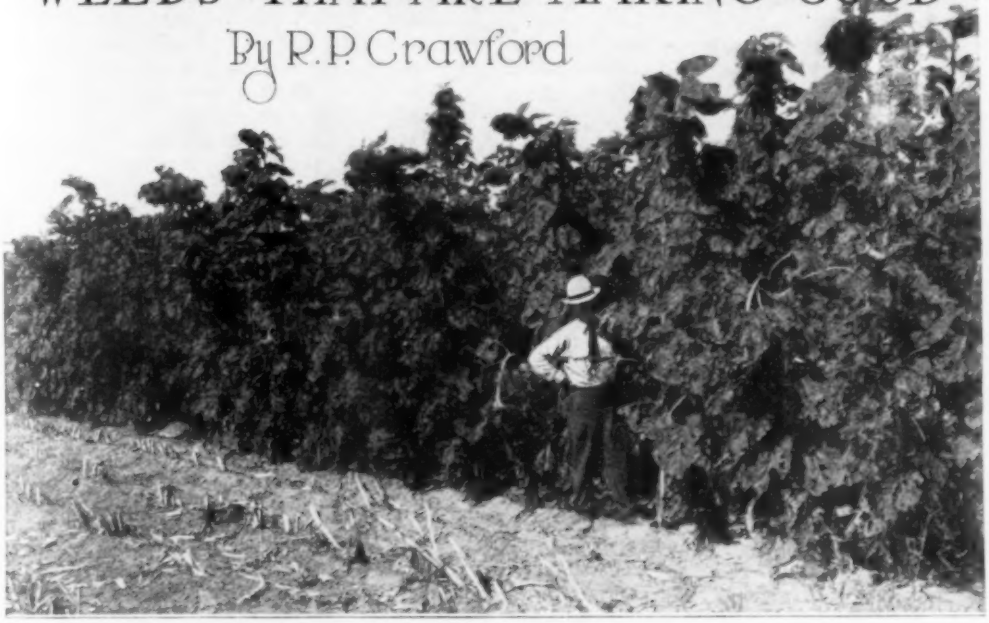
View of the Interior, with Its Couch, Bench, Water Tanks, and Electric Fan



Side View of the Compact Little Vehicle That Combines Easy Transportation with Comfortable and Even Luxurious Quarters for Living, Sleeping, and Eating

WEEDS THAT ARE MAKING GOOD

By R. P. Crawford



Giant Sunflowers Grown for Silage: The Russian Variety Used Grows as High as Twelve Feet, and as Feed for Cows It Appears to Induce a Greater Milk Production, with a Considerable Saving of Clover Hay

NOT all the romance connected with the utilization of the once useless is confined to the factory. There is much of it in agriculture, and many plants which were once considered weeds are now being harvested as crops. Probably there has been, during the last few years, nothing more striking in this connection than sweet clover.

Not so very long ago a great deal of talk was heard in the Nebraska legislature of declaring sweet clover an outlaw and pest, but most of the then legislators and farmers have lived to see hundreds of fields of it not only in Nebraska but all over the country. At one time the bee men were accused of surreptitiously sowing it along the highways, for it is great bee pasture, but the up-to-date farmer sows it for a crop and keeps a few stands of bees to make money from the flowers.

Few crops of the kind have proved such a success as sweet clover. It will grow in practically any part of the United States. It may be utilized for feeding purposes in the shape of pasturage, hay, or ensilage, and many farmers make good profits handling the seed. In many respects sweet clover compares favorably with alfalfa, and, being a biennial, it lends itself readily to a variety of crop rotations. Many farmers grow it simply to enrich the soil, some authorities declaring that it is unequaled by any other crop for that purpose.

Another example of similar nature is the sunflower, which at present seems to be just coming into its own. At half a dozen institutions in the middle West experiments with it are under way, and the Montana Experiment Station has tried it with good results in the form of silage as a feed for dairy cows. The mammoth Russian variety, which attains a height of 7 to 12 ft., was used. One lot of cows was fed grain and clover hay, while the other lot was fed grain, clover hay, and sunflower silage. Both lots received the same amount of grain. One lot received 21 lb. of clover hay per head daily, while the other received 12 lb. of clover hay and 34 lb. of sunflower silage. The average milk produced per cow daily was 34.35 lb. for the latter ration, and 33.37 lb. for those receiving grain and clover hay. No objectionable flavor was found in the milk from the cows fed sunflowers. An average daily feed of 34 lb. of sunflower silage effected a daily saving of approximately 9 lb. of clover hay per cow. The two lots of cows were alternately fed the two rations for an equal length of time, thereby making sure that no differences in the two lots

themselves accounted for the results. The yield of sunflowers under irrigation was 36 tons per acre.

Experiments along the same line have also been conducted at the Scottsbluff Experiment Farm at Mitchell, Neb. As a result, farmers are advised not to "go too strong" on sunflowers as yet, but to try out a small patch of sunflower for silage. Work is also being done at the Nevada Experiment Station. In that state the sunflower is ready for harvest by September 1st, and can be cut green and put into the silo before danger of frost. Corn, on the other hand, is often damaged by a killing frost before it has reached the silo stage.

One of the most interesting instances of the use of weeds for feed is the Russian thistle. Scarcely anyone would think of feeding Russian thistles, yet there is one Nebraska farmer who hauled them for several miles, and made good use of them. He said:

"The Russian thistle is the most serious weed pest on the Truckee-Carson project. It will grow everywhere, where land is not cultivated under irrigation, and on the higher lands where the water does not reach it. Last year we experienced a shortage of crops to fill the silo, so I decided to use the Russian thistle. The thistles were cut with a mowing machine the last of August, just as the spines were forming on the plants, and placed in the silo at a total cost of $1.65 per ton. Salt was added according to judgment as the silo was being filled. We started feeding the silage to steers at night, with 8 lb. per head daily, gradually increasing this amount to 20 lb. for each feeding. The value of the silage is estimated at $7 per ton. It is highly relished by the stock, which are showing much better gains than those fed on alfalfa alone."

Certainly the moral of this item is not that everyone should plant sweet clover, or sunflowers, or Russian thistles. But does it not suggest the day when the utilization of the odds and ends will be as important in the field as in the factory?

CAR MADE IN ELEVEN MINUTES AT ENGLISH AUTO PLANT

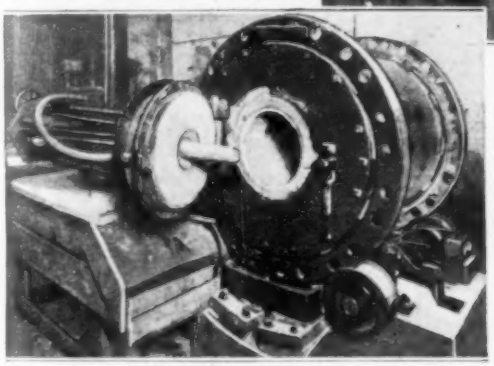
Workers in an automobile plant near Manchester, England, are jubilant because they have accomplished the complete assembly of one car in 11 minutes, breaking an American record established at Detroit some time ago. The plant that produced this remarkable British performance is a branch of the Detroit factory, using American methods of work. To speed up production, the competitive spirit is encouraged by posting output figures for the day and week on a large bulletin board, in which the employes display much interest.

¶ An award of $25,000 has been conferred by the British government jointly upon two inventors credited with designing the military tank. Others who had made acceptable suggestions were given smaller prizes in keeping with their helpfulness.

Sweet Clover, Once Regarded as a Pest, Now is Cultivated as a Crop on Many a Farm, and Used as Pasturage, Hay, and Silage. Special Sleds are Constructed for Hauling It from the Field to the Threshe

REVOLVING ELECTRIC FURNACE HAS POINTS OF ADVANTAGE

An electric brass furnace in the shape of a revolving drum has recently been subjected to its first commercial tests, which indicate a considerable advantage over ordinary forms, in labor and other costs. The drum carries a metal hoop at each end and is revolved by rollers, without gearing, sliding contacts carrying the current. The electrodes are arranged in the axis of the drum, and one is carried by a circular door which admits the charge. The tap hole is at the opposite end, and is stopped with

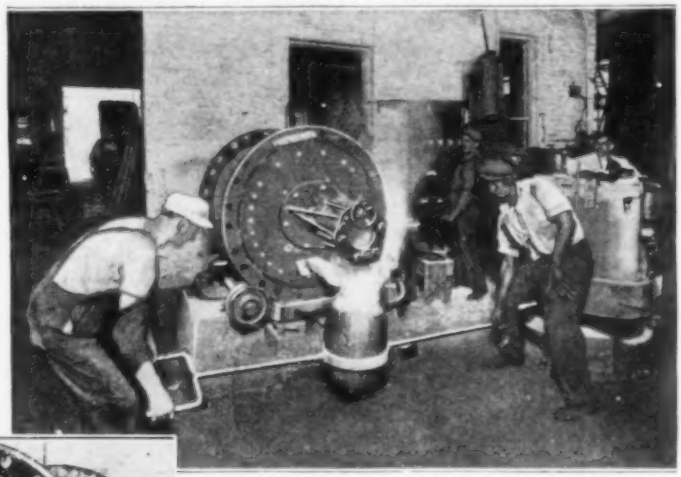


Front View of Rotating Electric Furnace, with Door Open to Admit Charge: One Electrode Is in the Door. The Driving Rollers Are at the Bottom

foundry sand while melting. The lining, of refractory material, has few seams, and may be renewed by removing one end of the drum. It is uniformly heated by the washing of the melted metal during the complete rotation of the furnace, which also insures thorough mixing of the charge. Capacities of 250 to 3,000 lb. are the sizes made at present.

HYDRAULIC BLASTING MACHINE FOR USE IN ROCK

Rock blasting with water, instead of explosives, is advocated by a European engineer, who has designed a machine for this purpose. The device consists of a cylinder, intended to be inserted in a hole drilled in the rock, and equipped with eight displacing pistons, arranged telescopically. When the cylinder is filled with water, and the pistons forced into it, the enormous pressure created in the hole bursts the rock. The contrivance is recommended for use in mines where it

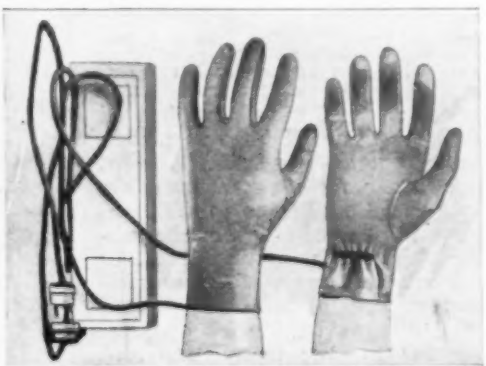


Making a Pour from the Tap Hole of the Rotating Furnace Drum: The Workman in the Background is Operating the Electrical Control Switchboard

is dangerous to employ explosives which sometimes start disastrous fires.

AUTOISTS KEEP FINGERS WARM WITH ELECTRICAL GLOVES

Any auto driver who appears to be bound to his car by a cable from his wrists undoubtedly has on a pair of the new English electrically heated gloves. Flexible heating wires laid between the layers of fabric allow full use of the hands, and keep them comfortably warm clear to the finger tips in the coldest of weather. They consume little current, and there is no danger of overheating.



Gloves for Winter Driving, with Electrical Heating Wires Woven into Their Fabric

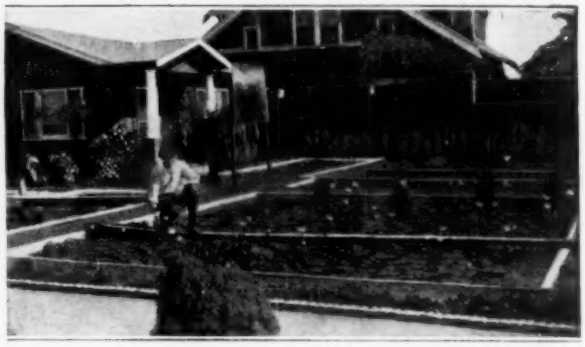
WATER GARDENING: A NEW FLORAL INDUSTRY

By JOHN EDWIN HOGG

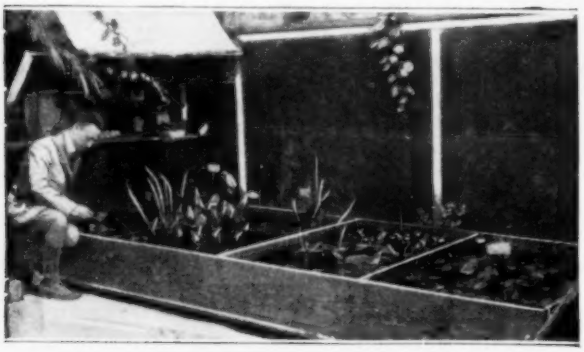
From Sample Aquatic Plants, Grown in Lawn Pools, Customers Select the Varieties They Desire

THE ever-increasing popularity of lawn pools and water gardens has recently given rise to an entirely new branch of the floral industry: that of cultivating aquatic plants and of installing such gardens under contract. Since the inception of this industry less than two years ago, some 150 varieties have been developed from the few suitable species then known. The revenues of the business are derived from the sale of flowers, plants, bulbs, goldfish, tiny turtles, frogs, and other fresh-water aquarium creatures, in addition to the planning and construction of the gardens and pools.

With the advent of this new industry the householder is no longer thrown upon his own resources for the installation and artistic arrangement of a contemplated lawn pool. Instead, he calls upon the water gardener where he may look over a number of sample pools, select various plants, and get ideas for the type of pool best suited for his particular requirements. The gardener quotes approximate construction prices, together with plant prices and estimates for the completed garden, and also has photographs of previously installed pools, from which the prospective purchaser is given additional ideas.

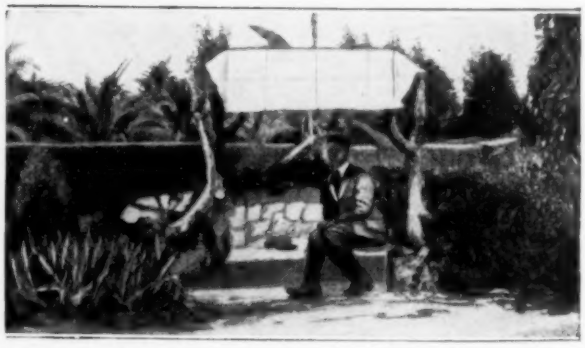


Beds of Water Lilies, Containing Some 150 Varieties, Developed from Less Than 20 Kinds in Two Years

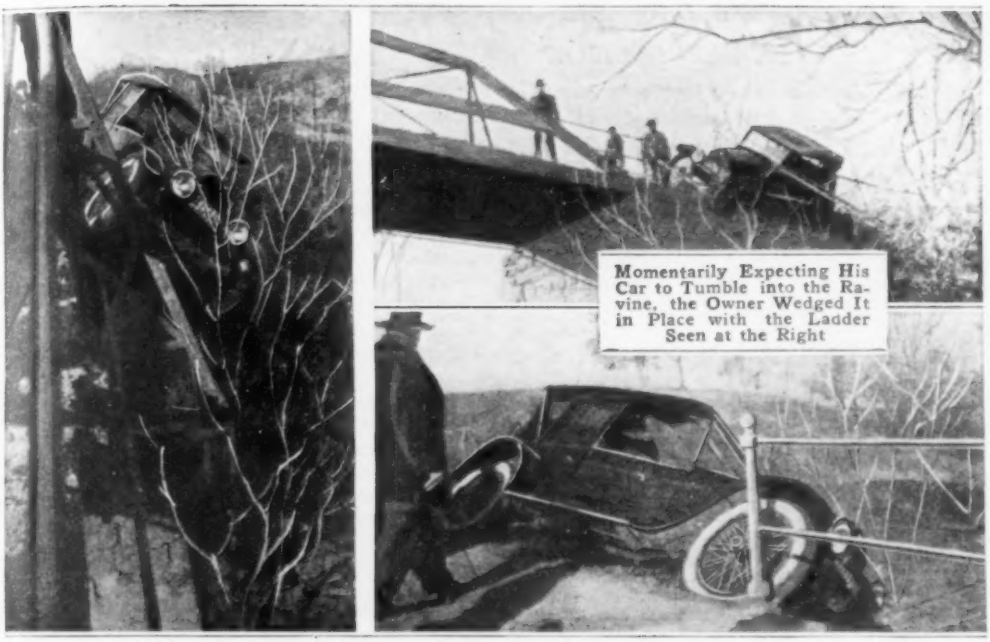


Rare and Costly Aquatic Plants Keep Company with Goldfish, Snails, Frogs, and Baby Turtles in These Shallow Wooden Aquaria

Obviously, this type of gardening is a highly specialized branch of the floral industry. Hence the professional water gardener is able to render a service that the average landscape gardener could not give. Incidentally, the purchaser is able to buy a better aquatic garden, and better plants on contract, as well as at a saving, compared with the costs of private experimentation.



Part of the Water Gardener's Stock in Trade: Rustic Effects, Cosy Resting Places, and Scenic Bits



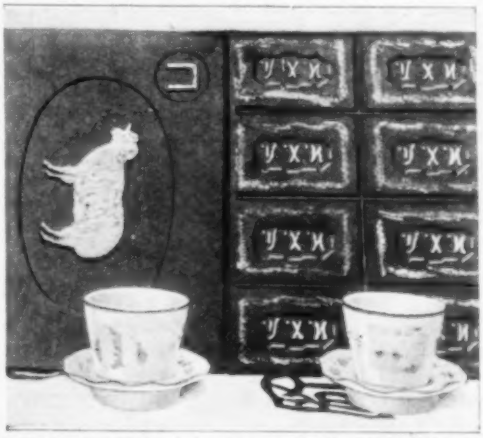
The Final Position of the Automobile is Shown at the Lower Right. It will be Seen That Disaster was Averted Only by the Precarious Grip of the Two Wheels upon the Edge of the Embankment. The Drop That Awaited the Car is Suggested by the Photograph at the Left, Snapped from the Opposite End of the Bridge

AUTO BALANCES ON EDGE OF HIGH EMBANKMENT

A can of milk was the instrument chosen when the Fates decided to show a farmer living near Farmington, Ill., the thinness of the veil that separates life and death. Speeding to the creamery, with the can in the tonneau of his automobile, he heard it shift, and turned to steady it. In so doing, he unconsciously twisted the steering wheel, and the car leapt into the guard rail of a high steel bridge. His foot found the brake and stopped the car, but not until it had all but made the fatal plunge to the creek below. It hung, in fact, suspended at the top of the vertical embankment, only the two wheels on the right side holding it in place. The balance was so delicate that an additional inch of forward motion would have spelled disaster. Next morning the farmer salvaged his property.

TEA SHIPPED IN BRICK FORM TO ORIENTAL COUNTRIES

Chinese exporters prepare tea in a strange manner for consumption in Tibet and some parts of Russia. Pulverized tea leaves are mixed with water, and then molded into dense, hard bricks, averaging 5 lb. in weight, and usually about 1 ft. long, 9 in. wide, and 1 in. thick. In this form, the commodity can be shipped overland more economically than otherwise, as it occupies less space. The Tibetans, who are the principal users of this variety of tea, grind pieces of the



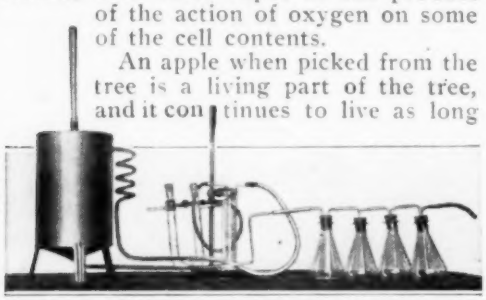
Brick Tea, Molded in China for Use in Tibet and Russia: The Cakes Are So Hard That an Ax Usually Is Necessary to Break Them

bricks between stones, and mix the resultant powder with an equal quantity of soft butter, made from yaks' milk and hot water, churned together.

PRESERVATION OF RAW FRUITS GOVERNED BY RESPIRATION

The respiration of animals is a well-known action, and its necessity is fully appreciated. That fruits and vegetables also breathe is not so generally understood; but all living cells, whether animal or vegetable, must have oxygen to keep them alive, and they give out carbon dioxide and water vapor as the product of the action of oxygen on some of the cell contents.

An apple when picked from the tree is a living part of the tree, and it continues to live as long as it remains sound, which may be weeks and even months after it was taken from the twig on which it grew. Its respiration during this time is not manifested by any perceptible action as in animals, but the exhalation of water and carbon dioxide is a well-established fact, as well as its absorption or "inhalation" of oxygen from the air.



Respiration Chamber and Flasks for Absorbing Exhaled Gas from Fruits, Specimens of Which are Inclosed in the Chamber in Their Natural State

After fruit is harvested, it is in precisely the same condition as hibernating animals. The bear sleeping in his winter den lives upon the fat stored in his body during the summer and fall. The apple lives upon the sugar and similar substances formed in its cells while it grew upon the tree. The rate of chemical change in fruit at a given temperature is of practical interest to fruit dealers and shippers, and a simple method to determine the amount of carbon dioxide exhaled by a fixed quantity of fruit in a certain length of time has been evolved. The apparatus for this purpose consists of a respiration chamber to hold the fruit, with an inlet through which purified air may enter, and an outlet connected with apparatus containing solutions for absorbing and measuring the exhaled carbon dioxide.

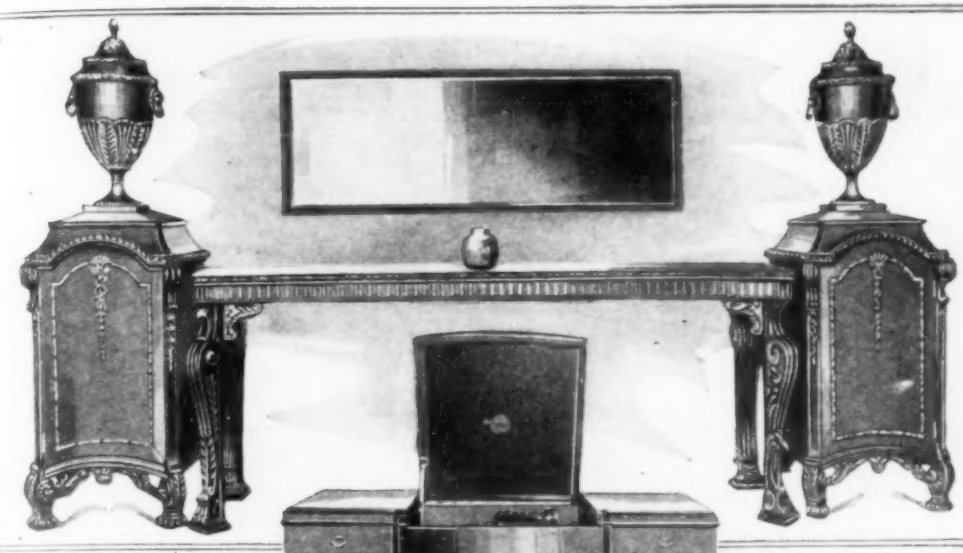
The particular temperatures at which it was desired to estimate the chemical activity were those of cold storage, of a cool cellar or storehouse, and of summer, or a warm room, viz., 33° to 35°, 50°, and 68° to 70° F. As a result of these experiments it was found that cranberries, in cold storage produced .0089 per cent of their weight in carbon-dioxide gas in 24 hours, while in the cool cellar twice as much was obtained, and in the warm room four times as much. In earlier experiments with Baldwin apples similar results were obtained, or .012 per cent, .0312 per cent, and .0528 per cent, respectively, under corresponding conditions.

The scientific interest of these figures lies in the progressive increase in activity with rise in temperature. The medium temperature approximately doubles the rate of the low temperature, and the high temperature doubles it again, or quadruples the rate of the low temperature. This is strictly in accordance with the law of acceleration of chemical action by rise in temperature, which states that, in general, this activity doubles or trebles with an increase in temperature of 10° C., which is equivalent to 18° F.

Practically, the figures point the fact that fruit in cold storage a little above the freezing point will remain sound from four to six times as long as at summer temperatures; but it will not keep indefinitely, because its soluble cell contents are slowly being consumed, and it ultimately reaches the dead-ripe stage of flavorless, punky tissue even if no decay organism comes in contact with it. It follows, also, that all kinds of fruits and vegetables need ventilation during storage. Tight packages are undesirable, and in some cases even paper wrappers may exclude the air too effectively. If there were no exchange of air between the inside and outside of a barrel of cranberries, it would take but a few days to exhaust all the oxygen within it, and the fruit would be as thoroughly asphyxiated as an animal under similar conditions. Asphyxiation of fruits has been found by numerous observers to result in the softening of cranberries during shipment, the scald of peaches and apples in cold storage, black centers in potatoes, and doubtless similar abnormal conditions in other vegetables and fruits as yet not investigated.

¶ In emphasizing the importance to the United States of adequate and modern coast-defense equipment, an engineer officer of the service points to the desirability of disappearing searchlight towers. The fixed type is declared to offer the enemy too conspicuous a target for his long-range guns.

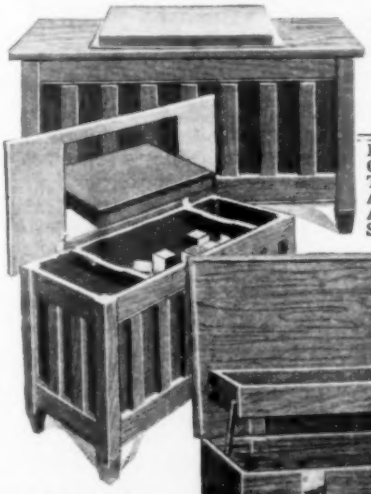
MODERN FURNITURE OF PLEASING DESIGN



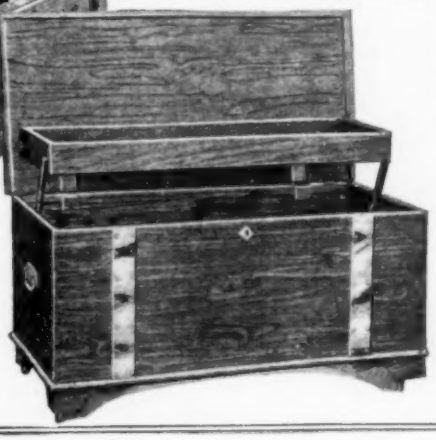
Three-Piece Buffets Are the Latest Creations in Dining Room Furniture. Included in Each Assembly Are Two Massive Cabinets and a Long Table. These Units are Elaborately Carved. An Oblong Mirror, Inclosed in a Simple Frame, and Hung behind the Table, Adds to the Beauty of the Arrangement

With Two Amplifying Chambers, a New Phonograph Produces a Large Volume of Sound, and Is Suitable for a Big Room, Where an Ordinary Machine Is Inadequate. In the Center Is a Commodious Record Cabinet

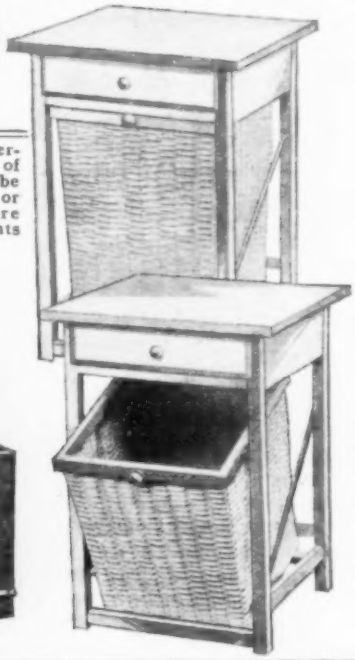
Convenience and Neatness of Design are Combined in a Clothes Hamper Now on the Market. The Basket can be Tipped for the Insertion or Removal of Soiled Articles. A Drawer Contributes to the Usefulness of the Stand. Finished in White Enamel, the Utility Is Attractive in Any Bathroom or Nursery



By Reversing the Leather-Covered Seat in the Top of This Piano Bench, It can be Adjusted for Children or Adults. Music Rolls are Stored in the Compartments

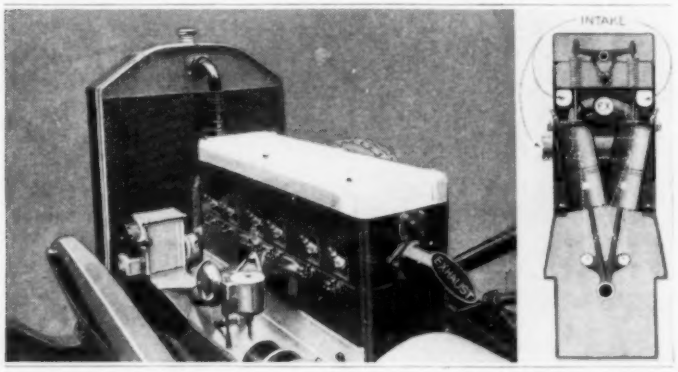


When the Lid of a Modern Cedar Chest is Lifted, a Top Tray is Elevated, Giving Access to the Contents of the Lower Part. Brass Trimmings and a Lock Are Other Features



NEW TWELVE-CYLINDER ENGINE IS ITALIAN MASTERPIECE

Besides being the only 12-cylinder engine exhibited at the recent motor salon in Paris, and the only one manufactured in Europe, a new automobile power plant made by a prominent Italian firm holds several other honors. It is declared to be the smallest 120-hp. engine yet produced, and owes its compactness to the arrangement of its two cast blocks, of six cylinders each, in a "V" of only 22°, opposite cylinders being offset so their connecting rods lie side by side. The cylinder heads are detachable, with vertical valves in the heads. The carburetor is attached outside the cylinder housing, and the exhaust is placed inside the angle of the two cylinder blocks.



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New Italian 12-Cylinder Auto Engine of 120 Horsepower, Made Extremely Compact by Arranging Its Cylinders in a "V" of Only 22 Degrees

LOCOMOTIVE STALLS PROVIDED WITH THREE SMOKESTACKS

Each engine stall in a new railroad roundhouse at Haselton, Ohio, is equipped with three stacks to carry away smoke, gas, and steam emitted by locomotives. The pipes, which are about 5 ft. square, are connected with funnel-shaped hoods that extend over the entire length of the stall. Both the hoods and the stacks are made of light lumber. A damper is installed in each vent. Two of the dampers are operated by cords, reaching to the floor, while the third, located nearest the stall door, opens automatically when the latter is opened. This arrangement makes the stacks effective, regardless of the position of a locomotive, and provides outlets when an engine is entering or leaving the stall. The structure is roofed with gypsum slabs.

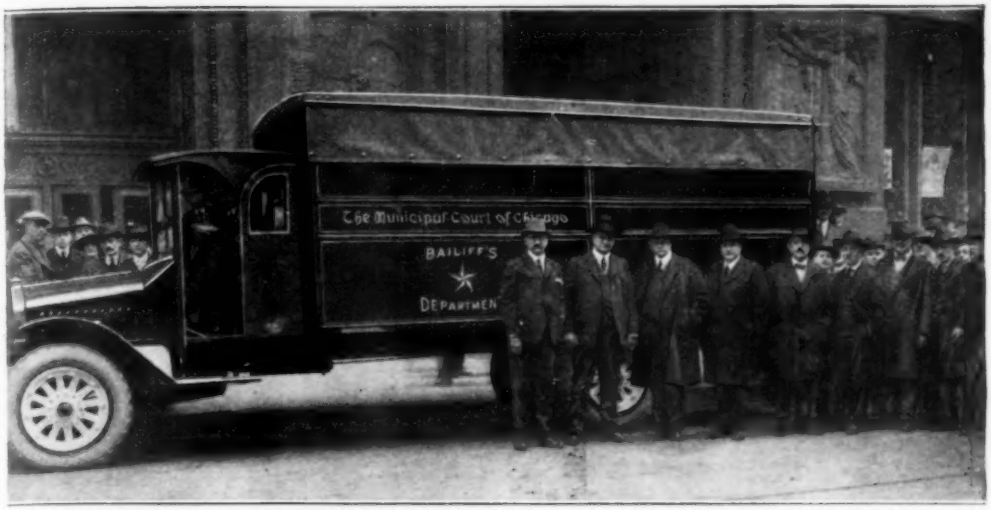
EXPANDING LIQUID CONTROLS HEAT OF ELECTRIC FURNACE

For regulating the temperature of electric furnaces, a Frenchman has invented a governor that depends for its action on the heat expansion of a liquid. A number of platinum contacts, connected to the coils of a rheostat, are set in the side of a vertical tube, which is filled with mercury. Pressing upon the top of the mercury is a very expansive, nonconducting liquid, which is directly affected by the heat of the furnace. In operation, as the furnace temperature mounts above a determined mark, the liquid expands and forces the mercury level down. In so doing, it pushes the mercury below one platinum contact after another, and thus throws more and more resistance into the circuit until the temperature rise is checked.

PRIMITIVE PHILIPPINE OXEN DRAW MODERN FARM TOOLS

The plodding ox as an agricultural motor is picturesque and pastoral, but generally considered exceedingly primitive. In the Philippines, however, the ancient and modern are being forced to meet, and now the sight of a carabao bull hitched to a new and highly efficient farm implement is by no means uncommon. The transition from the forked-stick plow to American machinery is quite recent, but tractors and cultivating machines already are widely used in the rice fields.

The Modern Farm Tool is Still Drawn by the Old-Time Ox in This Transitory Period of Philippine Evolution



This Big Carryall was Bought by the City of Chicago to Handle the Rather Heavy Passenger Traffic between the Municipal Court and the Local Bridewell. Sixty Passengers can be Loaded into the Boxlike Body. The Photograph was Taken in Front of the Chicago City Hall

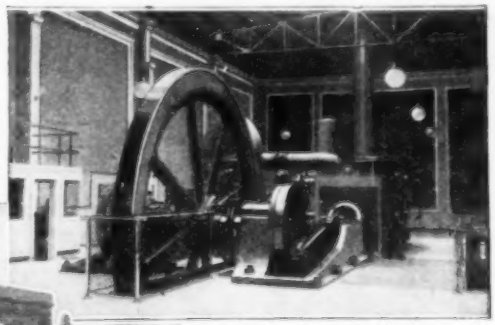
THREESCORE PRISONERS MAKE LOAD FOR COURT'S CARRYALL

Although a commodious, easy-riding vehicle, the automobile carryall recently purchased by the city of Chicago is already unpopular with those it carries. It continues to journey, nevertheless, between the municipal court and the local bridewell, several miles away. The long interior will hold 60 in an emergency, and so can accommodate the usual Bolshevik mass meeting in its congenial entirety.

ARTISTIC PUMPING STATION IN WESTERN CITY

Situated in a section of San Francisco, where many fine homes are being erected, an artistic water-pumping station, operated by a private corporation, does not mar the beauty of the neighborhood, as there is no hint of its use in its exterior appearance. Surrounded by shrubbery, the building, with its Doric columns and other simple, but tasteful, decorations, looks like a library, or other similar public building. The pumping station is unusual, also, in that it is lighted by skylights, there being no windows in the walls.

¶ The financial complications of Siberian business are perplexing. Merchants in one center accept Romanoff, Kerensky, and Siberian rubles, American dollars, and Chinese yen, all of which fluctuate daily. A note of any kind that is stained or torn has lost a good part of its face value. Such conditions add appreciably to the difficulties of Red Cross relief work.



Even a Careful Examination of the Exterior of the Artistic Building at the Left does Not Disclose Its Purpose. It Is a Water-Pumping Station, Situated on a Boulevard in a Western City, and is Lighted Solely by Skylights. The Interior is Shown Above

HEROIC STATUE OF PIONEER BORN OF CHANCE MEETING

A chance meeting between an artist and a rugged and picturesque survivor of American frontier days was the inspiration for a heroic bronze statue just erected on the campus of a western university. All the qualities of sturdy manhood with which racial tradition endows the character of the pioneer are expressed in the figure, which is nine feet in height. Its donor, a prominent attorney, intends that it shall serve the younger generation as a reminder of the indomitable spirit that hewed a place for them out of the wilderness.

ANNUNCIATOR BELL RINGS AS DOOR KNOB IS TURNED

For the front door of the home or small shop there is now made a sightly combination of knob and annunciator bell, the latter being fitted to the inside of the door. With this equipment the knob is made to do double duty, as it not only unlocks the door, but in so doing rings the bell. Operating mechanically in this way, with no dependence on electricity, the bell needs no attention after the day of its installation.

NAVY PLANS TO BUILD GUNS BY NEW HYDRAULIC PROCESS

A cheaper and more expeditious method of building guns up to 6-in., for the U. S. Navy, is now planned, according to the recently published report of the navy's chief of ordnance. Details are kept secret; it is known, however, that the new method, described as "radial expansion by hydraulic pressure," requires fewer sections for the built-up gun than the old heat-shrinking process. The report states, also, that work is going forward on monster 16-in. rifles for six 43,000-ton dreadnaughts and six great battle cruisers. The tax-paying public should be interested to hear, too, that accumulations of ammunition, and of mines intended for the North Sea mine barrage, are so great as to swamp every storage depot.

PADS OF WINDSHIELD CLEANER HOLD CHEMICAL MIXTURE

The two arms of the automobile-windshield cleaner illustrated are pressed against the inner and outer surfaces of the glass by steel springs. To each arm is fixed a narrow felt pad which has been impregnated with a chemical mixture. When the windshield becomes wet with rain or befogged with vapor, the arms are moved across the glass. Moisture dissolves the mixture which flows from the pads and leaves a film which sheds all water. One such operation is sufficient for a day of rainy driving.

WHEELLESS BABY CARRIAGES POPULAR IN INDIA

As wheeled baby carriages are out of the question on the stony roads of northern India, an ingenious substitute is provided in the "dandy," a sort of boxed-in chair which is borne upon the back of a sturdy hillman. In journeying between isolated plantations, children are sometimes carried from 25 to 30 miles a day by this means. The photograph was taken at Darjeeling, in the foothills of the eastern Himalayas.

Results of Using Dynamite for Breaking Clayey Soil in Kansas: Hard "Jugs" like the One Shown at the Left, are Formed by the Explosion. At the Right a "Jug" has been Cracked Open to Show How the Expanding Gases Ram the Clay Away from the Charge. The Gases Are Also Responsible for the Holes Always Found at the Top. The Experiments Demonstrate the Need of Discrimination in the Agricultural Use of Dynamite

DYNAMITE FORMS LARGE "JUGS" IN HEAVY CLAY

Researches conducted during the last two years at the Kansas Agricultural Experiment Station seem to demonstrate that dynamiting is not beneficial to every type of local soil. Results obtained in fields of heavy clay near the station are worth particular mention, as they include positive injuries to soil and crop. The experimenters find that explosion, instead of crumbling this earth, as desired, rather rams it away from the charge, forming a hard-walled, subterranean cavity, or "jug." Excavation after each explosion shows that the gas impact cements the walls of these jugs so solidly that they are impervious to water, and so cohesive that the jug may be removed in one piece. The queer objects are often two and three feet high, with walls from four to eight inches thick. Fruit trees planted over the cavities are sometimes drowned by accumulating water; corn and small grains grow poorly unless the jugs are filled with soil. On the whole, while the experiments do not disparage the agricultural use of dynamite, they do warn against its indiscriminate employment in unusual soils.

PHOTOGRAPHER SNAPS BALLOON IGNITED BY LIGHTNING

Although he has above his head thousands of cubic feet of combustible gas mixture, the balloonist fears little, if at all, the risk of ignition by lightning. In the entire history of aeronautics only a few disasters from such a cause have occurred; and of these only one is thought to have been caught by the photographic lens. The picture is reproduced on this page, and shows a military kite

Of the Relatively Few Balloons That have been Struck by Lightning, This is Believed to Be the First Snapped by the Camera as It Burned in Mid-Air

balloon just after the bolt had struck. The bag is collapsing as the fabric is consumed.

¶ With but little hope of success, an investigator of stammering recently advertised for a subject whose skull had been trephined. He received a prompt reply, much to his surprise, and is now able to test the cerebral-congestion hypothesis described last August by this magazine.

RANGER'S PATIENT TOIL MAKES LONG STAIRWAY OF GREAT LOG

Kind Providence it was that felled a mighty hemlock, 140 ft. long, up the steep slope that separates the cabin of an Oregon forest ranger from his horse stable. But it was the ranger's own strenuous efforts with ax and saw which slowly transformed the great log into a stairway of more than a hundred steps, and with guarding handrails at either side. The climb up the hill is now made easily.

Straight as an Arrow Lies the Great Hemlock Tree on the Slope beside the Forest Ranger's Cabin. Working during Leisure Hours with Ax and Saw, He Transformed It into a Convenient Stairway

ONLY ONE ASYLUM FOR INSANE IN ALL CHINA

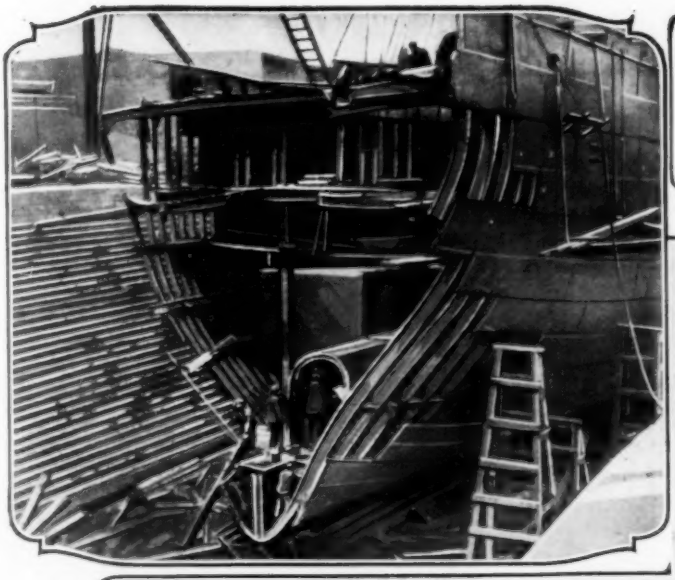
Startling proof of China's lagging response to the stimuli of western civilization is found in the fact that the hospital at Canton is the only asylum for the insane in the entire land of some 300 or 400 million inhabitants. National superstition accounts for this deplorable condition. Despite the teachings of missionaries, the mass of the people still consider an insane person possessed of the devil, and hence unaffected by medical care. The unfortunate one, if harmless, is given his freedom; if violent, he is held prisoner by his family, sometimes being chained to a stake. The superintendent of the Canton asylum is now campaigning in this country for funds with which to establish another hospital. The parent institution holds about 600 patients.

¶Saccharin is a dangerous substitute for sugar, according to government chemists, who made an announcement to this effect recently when it became known that the substance was being used for sweetening food by housewives. The drug is regarded as a menace to health when used in cooking, and its indiscriminate sale is forbidden by law in most states.

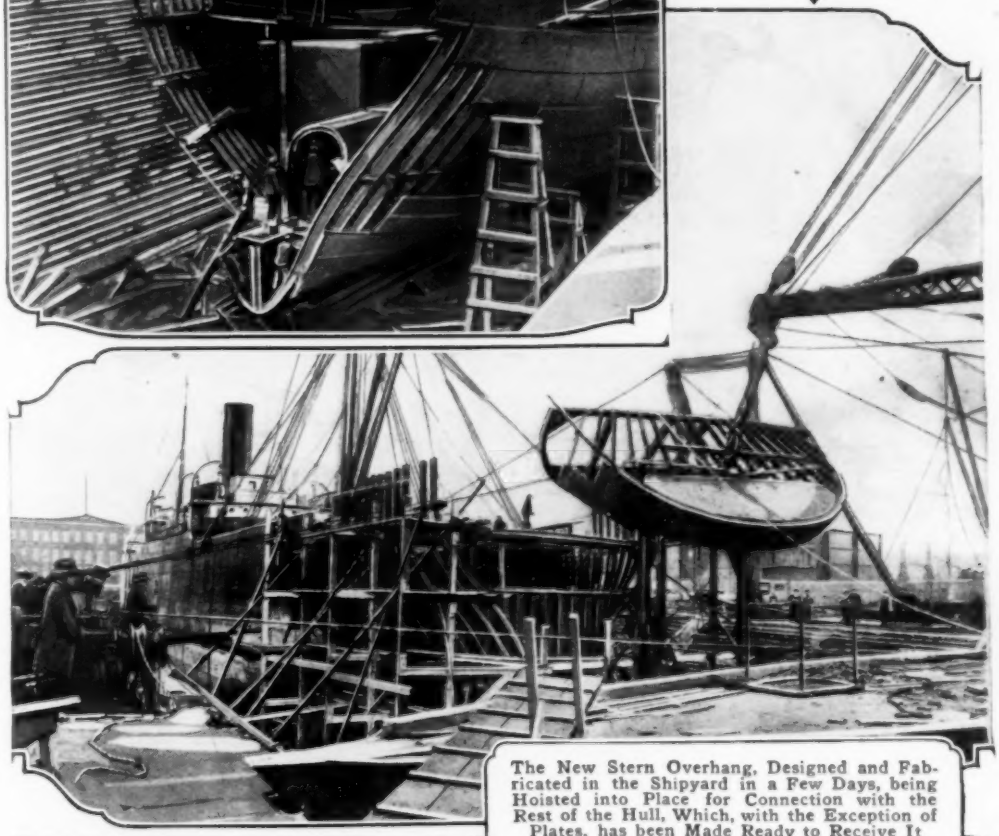
STEAMER REPAIRED IN EIGHTEEN DAYS

The freight steamer "Lord Dufferin," which was rammed in New York Harbor by the Cunard liner "Aquitania" and cut in two, was repaired in 18 days, the stern being completely replaced in that record time. The freighter had been sunk and the stern cut off about 12 ft. from the poop deck. The vessel was successfully raised, but the after portion, including rudder, stern frame, shaft, and machinery, was completely lost, although divers explored the harbor bed to find it.

This made it necessary to fabricate the missing portion, and the vessel was put in dry dock in South Brooklyn. Three molds were taken of the sound portion of the ship, and a new design made for the portion to be supplied. All the needed parts were then built, and in a few days put together and made ready to be placed in position. This part of the task was a difficult one. The entire stern overhang of the vessel, from and including the transom frame, was assembled and riveted together, and after being hoisted in place, secured by stays. The counter of the ship weighed 12 tons and the sternpost 11 tons. Meanwhile, the necessary ship fittings were completed in time to be ready when the hull had advanced far enough to receive them. The feat aroused the attention of shipbuilders all over the world, because of its workmanship as well as its celerity.

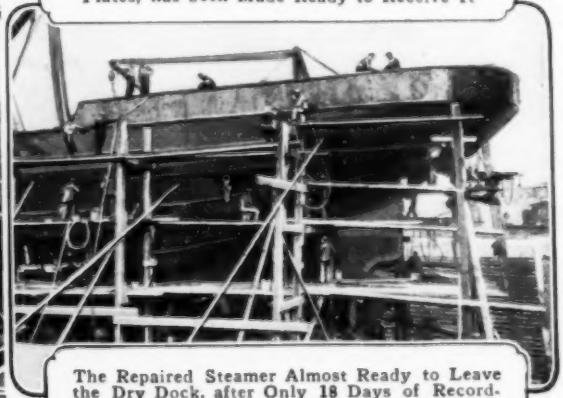


Cutting Away the Damaged Plates of the "Lord Dufferin's" Forward Part, After the Steamer had been Cut in Two by Another Ship, and the Stern Portion Lost: The Workmen are Making Ready to Install a New Stern



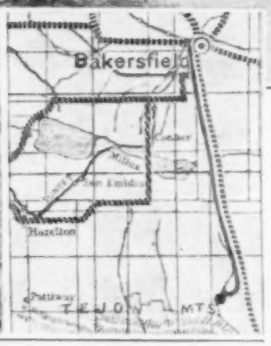
The New Stern Overhang, Designed and Fabricated in the Shipyard in a Few Days, being Hoisted into Place for Connection with the Rest of the Hull, Which, with the Exception of Plates, has been Made Ready to Receive It

Final Plating of the Stern Overhang, and of the Junction Point between the Old and the New: The Counter Weighed 12 Tons and the Stern Post 11, Making a Difficult Job of Assembling



The Repaired Steamer Almost Ready to Leave the Dry Dock, after Only 18 Days of Record-Breaking Work: In This Time All the Lost Parts and Machinery of the Stern Portion were Replaced, and the Joining of the Two Parts Completed, Making the Ship as Good as New

DITCH ACROSS DESERT WATERS ROADSIDE TREES



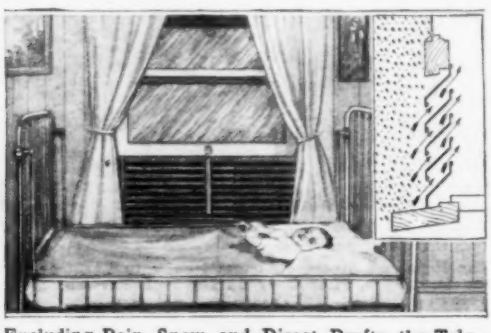
The Desert Highway, the Tiny Irrigation Ditch at the Left, and the Recently Planted Trees are Seen Above

Below, at the Left, Is a Closer View of the "Littlest, Longest Ditch;" at the Right, a Map of Its Course

Despite its insignificant size, an irrigation ditch recently completed by the California highway commission is remarkable in several ways. Its first unusual characteristic is its great length, 42 miles. Its purpose also is peculiar, for it is devoted to the task of making trees grow along the stretch of concrete highway that runs, straight as a ruler, south from Bakersfield into the verdureless desert. Another interesting feature is a pipe line that follows the ditch, helps it perform its function, and supplies thirsty travelers and empty auto radiators at convenient taps along the way. The water is taken from the foothills of the Tejon Mountains, and there is a 1,500-ft. drop from its source to Bakersfield, so gravity can be relied upon to maintain the supply. Both water and trees will be a boon to the auto tourists who cross the desert in the season of torrid heat.

TELESCOPING VENTILATOR ADJUSTABLE TO WINDOW

An efficient, all-metal ventilator now fills the popular demand for an appliance adjustable quickly, and without screws or cleats, to any window of ordinary size. This variable-width feature is made possible by the use of telescoping slats, which serve regularly to deflect the entering air upward and to exclude rain and snow. Installation is simple. Placing the ventilator on the sill, it is expanded to fit the window, after which the sash is lowered upon it.



Excluding Rain, Snow, and Direct Drafts, the Telescoping Ventilator is Well Fitted for Installation in the Nursery, as Above. It is Shown in Cross Section at the Right

SEWER PLUGGED BY CROCODILE IN PANAMA CANAL ZONE

Employes of a government slaughter house in the Canal Zone were greatly puzzled recently when a sewer leading from the plant was found to be plugged. Efforts were made to locate the obstruction, but none could be found, though soon after each investigation the pipe would again cease to function properly. The mystery was finally solved by one of the workmen, who placed a baited hook,

attached to a heavy chain, in the sewer. With this tackle was captured a large crocodile, which had crawled into the passage to feed. The reptile's body nearly filled the drain.

DIES MADE FROM REAL HIDES STAMP IMITATION LEATHER

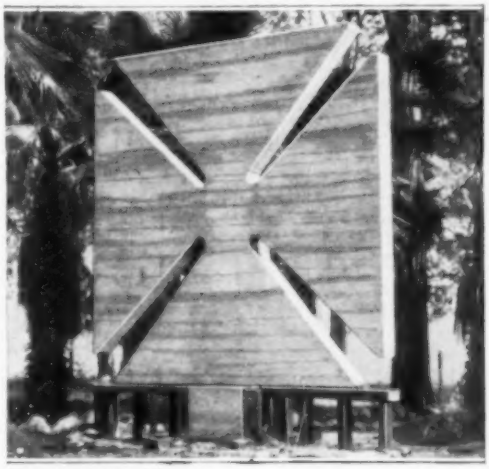
To make imitation leather counterfeit the real article as closely as possible, the grain of its surface is formed with dies made from impressions of actual hides, by a new and ingenious process. The system used is similar to electrotyping. The metal film deposited on the hide copies every line and pore of its surface, and when stripped off is used to make either flat or cylindrical impression plates. These, pressed by power on the artificial leather, mark their exact counterpart upon it. Copies are thus made of any desired kind of leather.

ENGLAND ENTERTAINS ARABIAN WARRIOR CHIEFS

England has never entertained visitors more picturesque than the Arab chieftains who fought on the side of the allies during the war. A large part of their stay of several weeks was spent in London, which astonished them quite as much as their bright robes and curving swords astonished London. The distinguished party is shown below at Greenwich Observatory, not far from the metropolis. All eyes were on the "time ball," as it was explained by the royal astronomer.

MONUMENT BUILT OVER GRAVE OF FAMOUS RACE HORSES

Beneath the Maltese cross, then the emblem of a famous American racing stable, once ran "Volante," "Emperor of Norfolk," "Silver Cloud," and "Rey el Santa Anita," thoroughbreds all. All now are dead, but their memory is to live. The daughter of the dead owner has caused the erection over their grave of the old emblem, done now in concrete, and measuring six feet square. The monument will eventually be painted red and black, while upon a bronze tablet will be engraved the four names of the horses.



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This Maltese Cross, of Concrete and Six Feet Square, Stands above the Grave of Four Great Race Horses. A Bronze Tablet will Eventually Display Their Names

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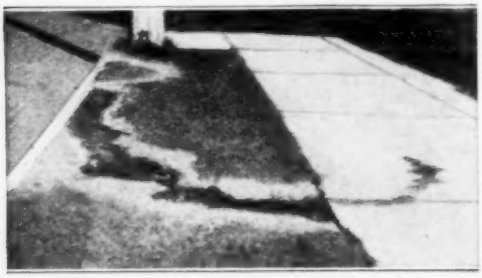
Listening Raptly, as the Royal Astronomer Explains the Operation of the Time Ball at Greenwich Observatory, Stand the Arab Sheiks, Recently the Guests of the British Nation

BROKEN HIGH-TENSION WIRE LEAVES INDELIBLE TRAIL

As high tensions go nowadays, a 15,000-volt electric wire classes as a technical trifle. But it is not to be trifled with,

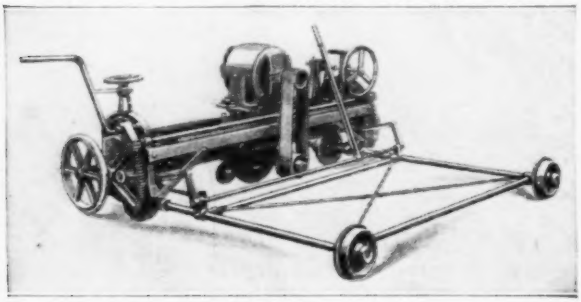


The Sinister Blot Apparent upon Sidewalk and Lawn Is the Burned and Pitted Trail of a Broken High-Tension Live Wire

nevertheless, nor held in contempt. In a small southern California city, a power wire of that potential was forced into contact with the lighting-service wires, at 3 o'clock one recent morning, by a falling tree limb. Instantly, in 20 homes of the vicinity, meters and wiring were burned out and conflagrations started, four of the houses being destroyed. The charged end of the broken wire left a row of inch-deep pits, half an inch across, in the cement of the sidewalk, and burned the grass away wherever it touched. The townspeople now are banishing all dangerous wires from residence streets.

ELECTRICAL TRACK GRINDER HAS MANY NOVEL POINTS

A grinding wheel adjustable to the angle of the rail to be ground, a folding frame for the rail wheels, and pneumatic-tired wheels for use off the rails, are novel points in a new railroad track-grinding machine. The grinding wheel is driven directly from the electric motor, and is moved along the rail by a hand-wheel, the machine itself being locked to the track. It is shifted from the track wheels to the road wheels by turning a crank, and may then be towed by a truck.



The Wheel Frame of the Electrical Track Grinder Folds Up, and the Machine Then Rests on Its Pneumatic-Tired Ground Wheels

HINGED SHOE REPLACES WHEEL ON NEW TROLLEY HEAD

That a sliding shoe causes less wear on a trolley wire than the usual wheel, because of reduced sparking and impact, is the claim on which is based a new English form of trolley head for electric cars. The shoe is pivoted to a small link in such a manner that, when it is thrown from the wire, it falls out of the way, and cannot injure the cross supports. A pull on the rope immediately restores it, however, to working position, and it is then easily reseated on the wire. Higher speeds on turns, less knocking at crossings and switches, lighter weight, and better contact with and adhesion to the wire, are further claims.

BURN OIL TAKEN FROM WATER IN RED CROSS KITCHENS

Oil skimmed from stagnant pools of water is used as fuel by the operators of Red Cross traveling soup kitchens in Roumania. Due to the scarcity of wood and coal, low-grade lignite briquettes, which burn poorly, are practically the only fuel to be obtained in the stricken country. This material is soaked in oil for two or three days, after which it burns well.

INSECT AND FUNGUS KILLERS STUDIED BY EXPERTS

Hoping to discover means of producing cheaper and better insecticides than are now on the market, specialists employed by the Department of Agriculture recently started laboratory experiments, which will be followed by field tests of the materials obtained in this way. Much attention will be given to Bordeaux mixture, now very expensive on account of the high cost of copper, an essential ingredient. Arsenic compounds will be studied systematically, and attempts will be made to find efficient substitutes for nicotine. Several materials similar to the latter will be investigated.

WHERE THE EARTH COLLAPSES

By R. S. BOND

A large city in the coal region of Pennsylvania is one of those unfortunate places constantly threatened by Mother Earth. Because of the underlying anthracite fields, a great portion of the city is undermined. Weakened mine timbers or, perhaps, lack of proper timbering, causes the earth to open up at the most unexpected moments, drop a few feet to fill the passages beneath, and possibly wreck a house or two in the dropping thereof.

The Picture at the Left Shows the Third Story of a Three-Story House. The Rest of It has been Swallowed Up in the Collapse of the Coal Mine Underneath. At the Right Is a Close-Up View of One of the Houses Wrecked by the Sudden Crumbling

At the Left, the Earth has Literally Dropped Away from the House, Leaving the Entrance Inaccessible, So That It had to be Boarded Up. The Right-Hand Picture Indicates the Effect of the Cave-In on Gardens and Outhouses, Now Mere Ruins on the Brinks of Chasms

The annoying part of the matter, from the property holder's viewpoint, is that all property is purchased with the understanding that, unless the mining rights are purchased, also, the owner cannot forbid the mining of coal under his property, nor has he any redress where such mining causes damage to his land or home. In many sections of the city the residents live in constant dan-

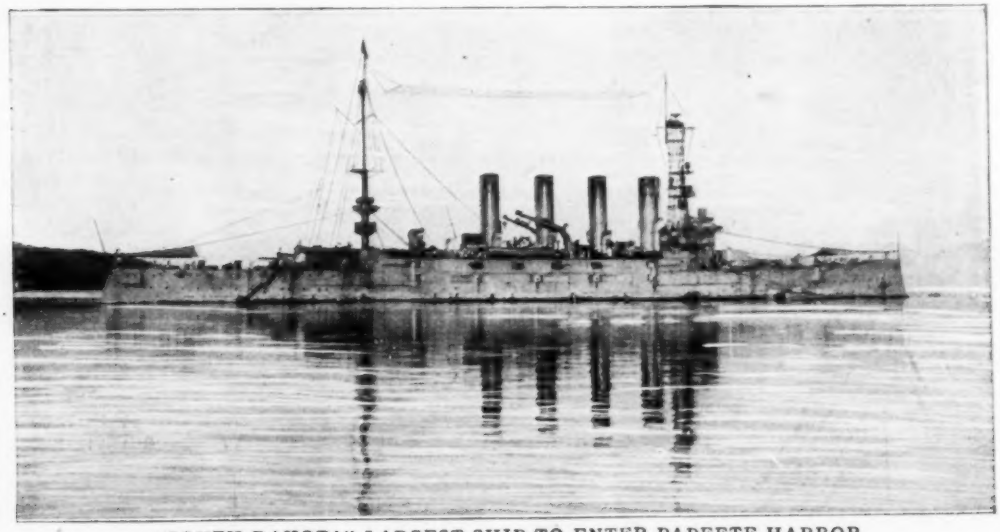
ger of waking up some night to find their house dropping a few feet and their garden developing fissures and caves which sadly disarrange the vegetables. Fortunately, many of these people soon prove the truth of the old saying that "familiarity breeds contempt," and live in a locality, which to others would be a constant nightmare, with little outward evidence of interest except as from time to time a new piece of garden, sidewalk, or cellar drops, and gives reason for a nine-days' gossip among the neighbors and a few columns in the daily papers.

The mine companies, although not legally responsible for such damages, quite frequently, if not always, do minor repairs without cost to the owner.

Mine cave-ins, like lightning, play queer pranks. In one town, several years ago, a hotel was completely swallowed up without loss of life. Some time later, in a big city, a teamster driving over a field in a heavy truck experienced something of a shock when his horses dropped out of sight, leaving him and his truck on the edge of a 30-ft. hole which had not been there a second before. Graves are opened quite frequently; sidewalks crack; miners have been known to come up suddenly from the cellar of an occupied home, preferring to leave their work by a short cut.

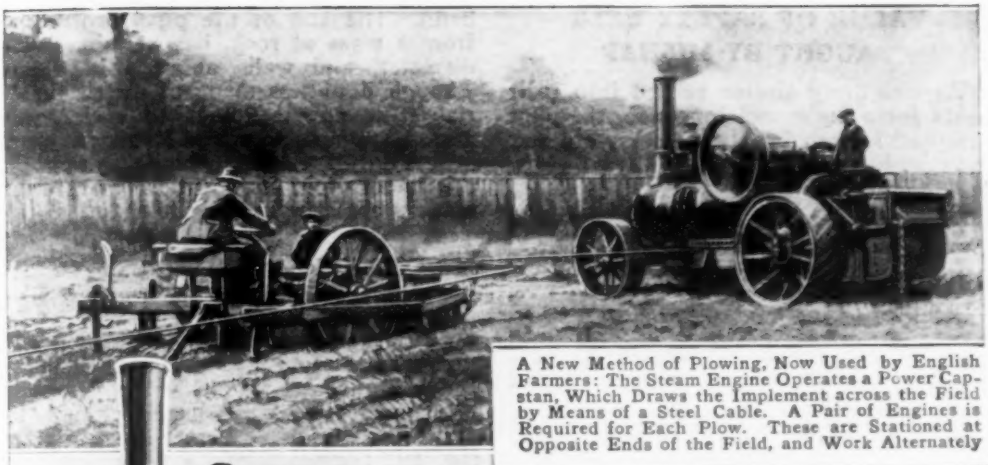
So much annoyance and loss of property has been caused of late that a surface-improvement society has been very active in trying to better these conditions.

The Children of These Undermined Communities, Inured to Danger, Find Much to Amuse Them in the Frequent Changes of Landscape. The Home of These Little Ones has Dropped into a Mine, but the Broken Sidewalk Is Furnishing Them Very Interesting Pastime



"SOUTH DAKOTA" LARGEST SHIP TO ENTER PAPEETE HARBOR

WHEN the U. S. S. "South Dakota" steamed into Papeete harbor in October, last year, it was a noteworthy event to the swarthy inhabitants of Tahiti Island, for two reasons. Besides being the largest boat that ever entered that port, it was the first American man-of-war that had landed there for more than 20 years. The vessel has a displacement of 13,500 tons and had on board 500 men. The Yankees were accorded a very warm welcome by the natives, who were most appreciative of the protection given their shores by the United States navy during the war. The island is the largest of the French Society Islands in the South Pacific, and is known for its pearl export trade.



A New Method of Plowing, Now Used by English Farmers: The Steam Engine Operates a Power Capstan, Which Draws the Implement across the Field by Means of a Steel Cable. A Pair of Engines is Required for Each Plow. These are Stationed at Opposite Ends of the Field, and Work Alternately

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SOLDIERS' PAY IN SIBERIA IS HUGE, FIGURED IN RUBLES

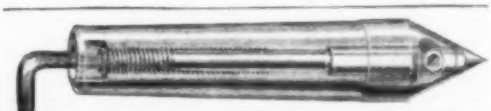
At the standard rate of exchange, as existing before the war, a Russian ruble is worth 51½ cents in American money. In the part of Siberia now occupied by American troops, however, returned soldiers report that the ruble is accepted at a value of just about ⅔ of a cent. At this rate the buck private's pay of $33 a month is equivalent to 4,950 rubles, and this, in turn, if exchange returned to normal rates, would be worth $2,549.25. The pay of a captain figures out at 33,000 rubles, or—again at normal rates—$16,990 a month.

PLOWS DRAWN BY CAPSTANS ON STEAM ENGINES

English farmers plow with steam engines, similar to those employed in this country for hauling and operating threshing machines, but equipped to serve as power capstans, not as tractors. A winding drum, geared to the drivewheel shaft and provided with a strong steel cable, revolves under the boiler. Two such engines, stationed at opposite ends of a field, are used for each plow. The latter is drawn across the area by means of the cables, the engines working alternately, and moving forward as the work progresses. This idea is not entirely new, as gasoline tractors similarly equipped have been used in France for drawing plows. Coal or wood is burned in the English engines.

ADJUSTABLE LATHE CENTER HAS HIGH-SPEED STEEL POINT

An adjustable point made of high-speed steel is the feature of a new lathe center, for which strong claims are made. A feeding screw in the body adjusts the point as it becomes worn, a setscrew fixing it in position. The point is readily reground because of its small size and resistance to heat, the operation taking only a minute or two. The high-speed steel gives great length of service at each grinding, and the worn point is easily exchanged for a new one.



Adjustable Center Point is Made of High-Speed Steel, Easily Replaced When Worn Out

VALUE OF SAFETY BELT TAUGHT BY MISHAP

As two army airmen settled into their seats for a flight, not long ago, the pilot strapped himself in; the observer did not.

This Mishap would have been Attended with No Casualties had Both Airmen Strapped Themselves to Their Seats. One Forgot, and was Injured

Clearing the boundary of the field at a height of only 30 ft., the engine died; the plane glided to a landing, nosed into the earth, and somersaulted. Strapped securely to his seat, the pilot was safely held in his cockpit; the observer, attached in no way to the plane, made a short flight, unassisted, and landed on his face. The incident was far from unusual, yet deserves the study of a public that is shortly to make the air its highway. A few precautions consistently practiced rob aviation of its dangers.

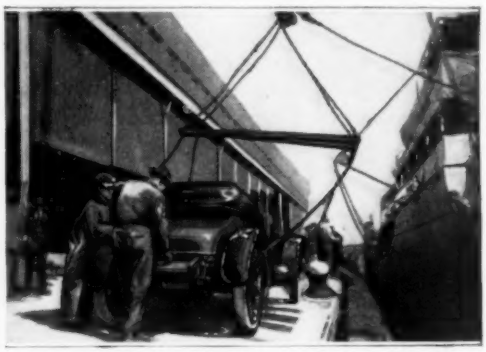
FIND PREHISTORIC PIPE LINE IN AMERICAN WILDERNESS

At least the beginnings of hydraulic engineering, as practiced in a bygone age, are revealed by the discovery, in the wilds of southern Utah, of a stone water pipe of unknown length, apparently molded by hand. The end of the pipe, protruding from a mass of rock, has a 15-in. inside diameter, and walls about 4 in. thick. Though doubtless made of plastic material, it is now solidified to rock hardness. Attempts to sound its length were unsuccessful. After photographing it, the finders lost its location, and forest rangers are now hunting it again.

Protruding End of the Ancient Stone Water Pipe: The Other Objects Are for Size Comparison

SIMPLE RIG PERMITS STEAMER TO LOAD UNCRATED AUTOS

As an accommodation to the many travelers who take their cars with them for touring purposes, a steamship company operating between San Francisco and the Hawaiian Islands no longer requires crating, but transports the automobiles just as they are driven to the dock. In consequence there has been devised a rig, or harness, in which the cars are transferred from dock to hold, and vice versa. It is simple, but effective. Four heavy ropes from the hoisting block are made fast to the spokes of the wheels. Two stout timbers, each parallel with and longer than the car axles, hold these ropes clear of the body, and during the passage from dock to hold prevent cramping and crushing of the fenders.

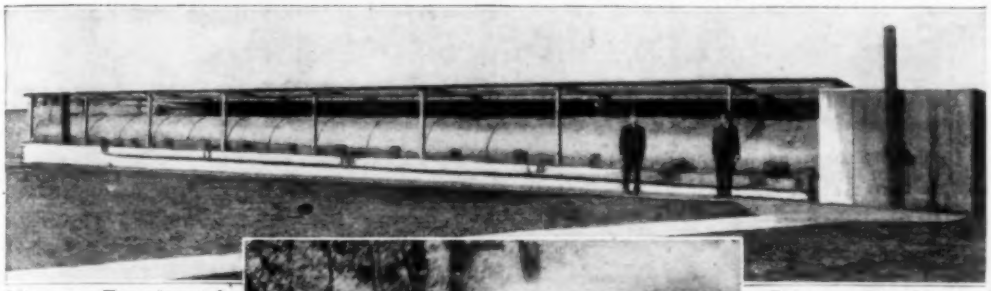


The Automobile is About to be Lifted into the Steamer's Hold for the Long Voyage to the Hawaiian Islands. The Simple Hoisting Harness Prevents Crushing of the Fenders

LITTLE ELECTRIC MOTOR HAS SPLASH-PROOF HOUSING

For use with house pump, washing machine, cream separator, or similar apparatus, there have now been developed small direct-current electric motors of 1/8 and 1/4 hp., which, being completely inclosed by splash-proof housings, may thus be used without fear of injury from splashing water and accidental contact.

TEST GRAIN-DUST EXPLOSIONS IN GALLERY



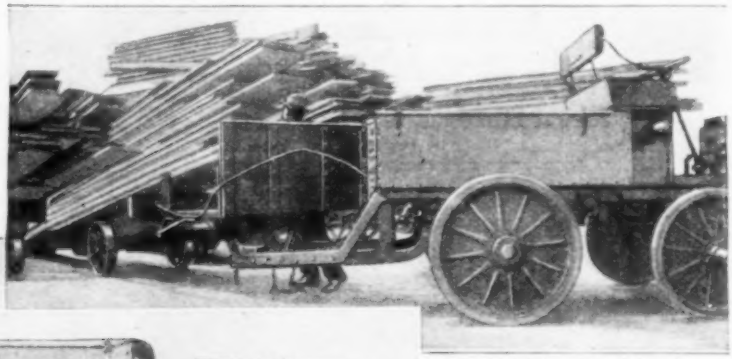
Above: Experimental Steel Mine Gallery Used for the Grain-Dust Explosion Tests

Below: The Blast of Starch Dust That Wrecked the Camera Man's Cage

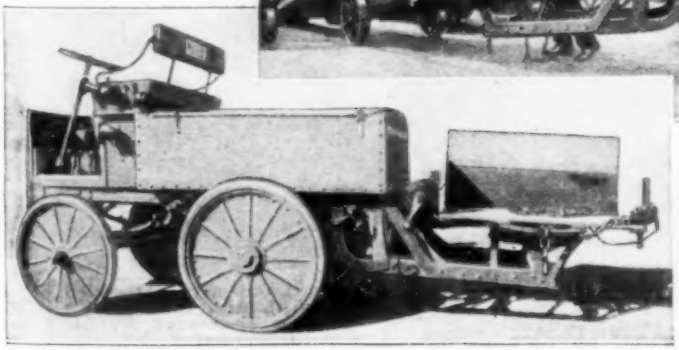
The explosive power of grain dust, frequently cited in these pages, was made the subject of an interesting test recently at Pittsburgh, in the experimental mine gallery of the Bureau of Mines. The long steel cylinder was charged with flour and starch dust, which was then exploded, while a camera man took motion pictures, for use in a campaign to reduce the present excessive loss from this cause. The blast was a great success, proving so violent that the cylinder was partially wrecked, the camera man's glass cage smashed, and the spectators blown over. The Department of Agriculture and the U. S. Grain Corporation conducted the test.

TURNTABLE ON TRUCK SPEEDS LUMBER TRANSPORT

For hauling two-wheeled trailers, loaded with lumber, about the crowded waterfront, a large box company now employs an electric truck with an ingenious towing attachment. It takes the form of a shelf supported by a turntable, the whole held by two steel arms at the rear of the truck. Great flexibility of operation is achieved in this way,



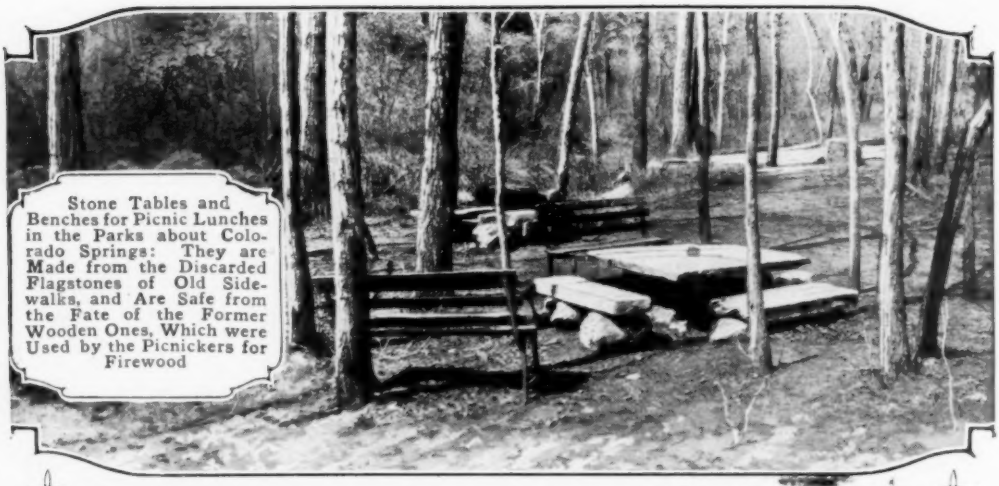
Piled High with Lumber, a Trailer is Here About to be Chained to the Turntable for the Journey to the Box Factory



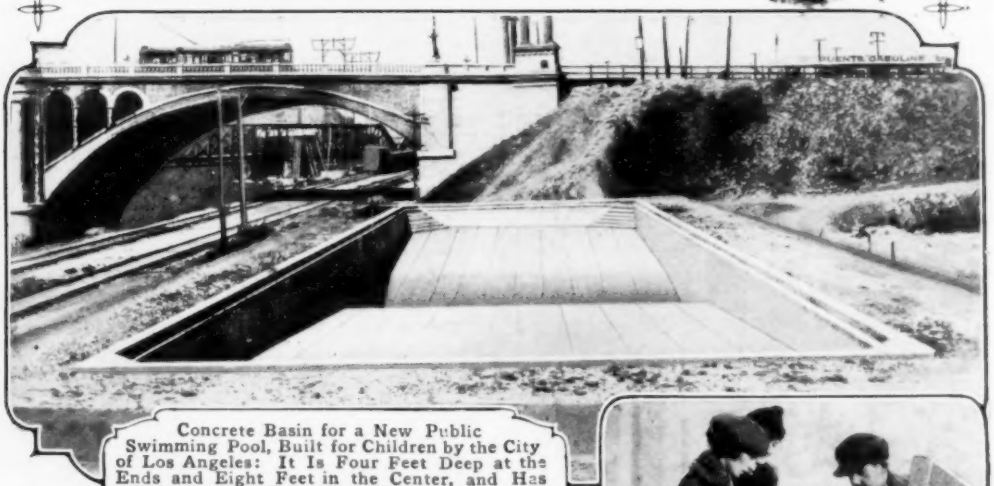
Supported by the Steel Arms at the Rear of This Electric Truck, the Turntable may be Revolved to Receive a Trailer Load at Any Angle. Chains Hold the Lumber to the Turntable Platform

as the truck may be backed up to a loaded trailer at any angle. After the shelf has been revolved on its turntable to the proper position, the lumber is chained upon it and hauled away.

CIVIC FEATURES THAT PROMOTE THE COMFORT



Stone Tables and Benches for Picnic Lunches in the Parks about Colorado Springs: They are Made from the Discarded Flagstones of Old Sidewalks, and Are Safe from the Fate of the Former Wooden Ones, Which were Used by the Picnickers for Firewood



Concrete Basin for a New Public Swimming Pool, Built for Children by the City of Los Angeles: It Is Four Feet Deep at the Ends and Eight Feet in the Center, and Has Stairs at Each Corner and Constantly Changing Water

The Official Electric-Light and Power Plant of a Village of Central Kansas Is a 40 to 80-Horsepower Farm Tractor Belted to a Generator. It was Installed in Emergency, but Proved So Satisfactory the Village Purchased It

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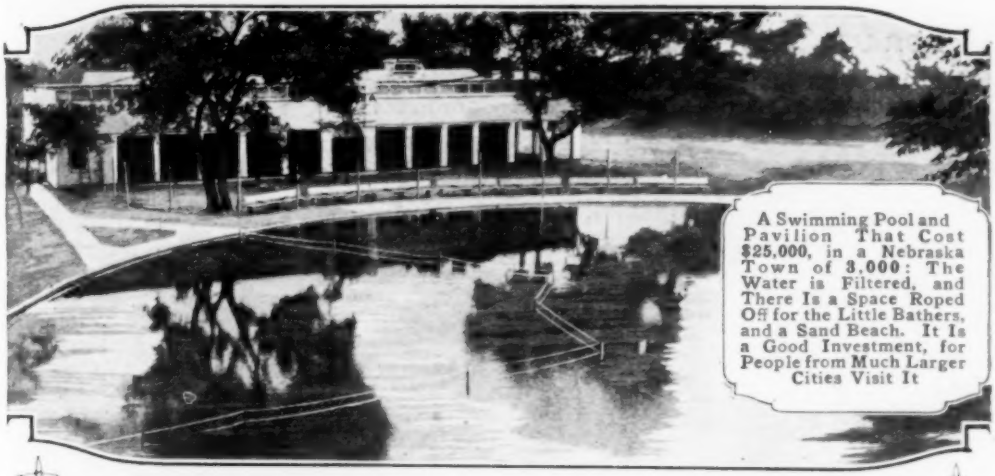
An Institution of the National Capital, Brought into Being by the Increased Number of Government Workers: A Lunch Wagon in Which Popular Box Lunches are Peddled at 20 Cents Each

AND ENJOYMENT OF VISITORS AND RESIDENTS



A Swimming Pool and Pavilion That Cost $25,000, in a Nebraska Town of 3,000: The Water is Filtered, and There Is a Space Roped Off for the Little Bathers, and a Sand Beach. It Is a Good Investment, for People from Much Larger Cities Visit It

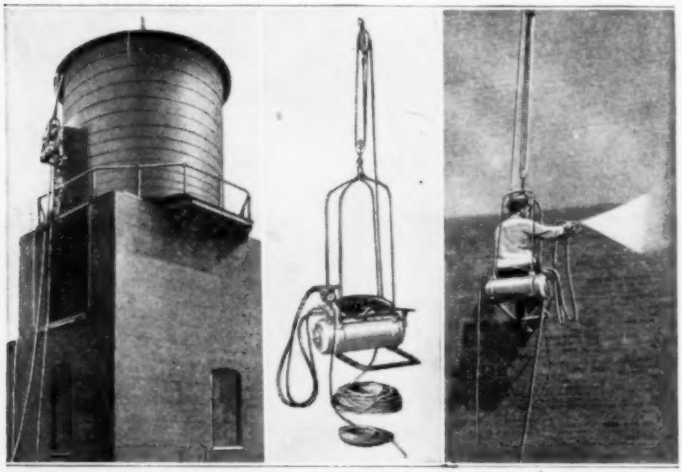
An Outdoor Roller-Skating Rink of Concrete, in a Massachusetts City Park: The Turns of the Big Oval are Banked like Those of a Regular Race Track. The Children Especially Approve of This Provision for Their Pleasure

Those Who Show Their "Love for Wild Flowers by Picking and Destroying Them, are Effectively Reminded, by Numerous Signs like This, in a Park on Hudson River, That True Regard for Nature's Beauties Includes Consideration for Others

A "Silent Policeman" of Heavy Galvanized Iron on a Concrete Base, in a British Columbia Town of 3,000: The Sign Is of Ground Glass, Electric-Lighted at Night, and Is Curious for Its Admonition, "Keep to Left." British Columbia Still Uses the Old English Rule

BOATSWAIN'S CHAIR ADAPTED FOR USE WITH AIR BRUSH

For use with his standard equipment, a manufacturer of air brushes now makes



The Comfortable Boatswain's Chair in the Center is Fitted with Full Air-Brush Equipment and a Capacious Paint Reservoir, Making Easy the Treatment of Surfaces like Those on the Left and Right

a metal boatswain's chair. Paint is contained in a tank below the comfortable seat, while compressed air is brought by a hose from any convenient source. A horizontal, rectangular guard below the tank serves as a foot rest, and holds the seat at a convenient distance from the wall. By the use of this chair large surfaces difficult of access are treated quickly, without the necessity of expensive scaffolding.

NUTRITIVE VALUES OF FOODS STUDY OF NEW COUNCIL

Properties of foods of all kinds, their nutritive values, most effective combinations, and proper preparation, form the subject of study to which a new committee of the National Research Council will devote itself. The organization of a National Institute of Nutrition is one project of the group of scientists and experts appointed for the new governmental activity. Problems of infant nutrition, hospital-food standards, and conditions of producing foodstuffs will be included in the broad scope of their work.

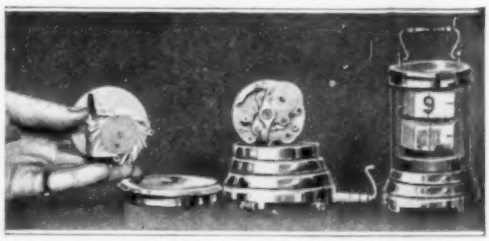
¶Hogs fed by automatic mechanical devices are fattened for market more rapidly than those fed by hand, according to figures compiled at the University of Missouri, following a series of experiments.

ACTIVITIES OF "DOVER PATROL" OF BRITISH NAVY TOLD

The remarkable activities and accomplishments of the "Dover Patrol" section of the British navy in the war have only recently been divulged. This peculiar fighting fleet was made up of 24 different types of war vessels, under the command of an admiral. Its ships, against the longer-range guns of the Germans, drove the enemy out of Ostend harbor, and practically out of Zeebrugge into Bruges, and then prepared to bombard the latter place with 18-in. guns mounted on monitors. The smaller monitors rolled so violently that one of them tilted 45° each way twice in ten seconds. The fleet also made preparations for an adventurous landing on the Belgian coast, pushing across the channel great pontoons, 560 ft. long that had been built secretly in England.

TURNING LEAVES SHOW TIME IN LANTERNLIKE CLOCK

The hour and minute are displayed in plain Arabic numerals by the latest freak clock from abroad. Placed within a vertical cylinder of glass, two "clusters" of celluloid leaves take the place of hands and circular face. The 12 leaves of the upper group mark the hour; while the



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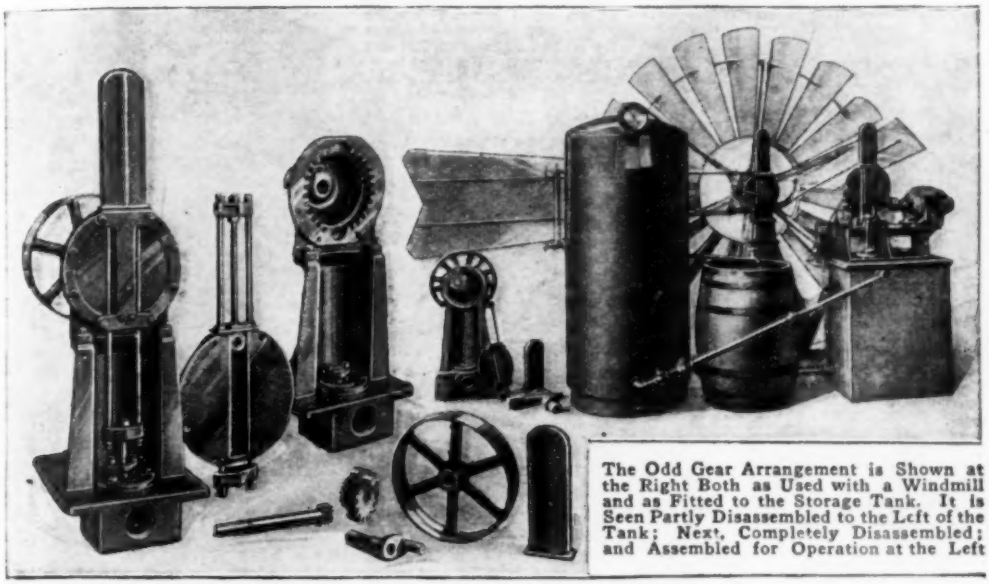
The Clock is Shown Complete at the Right. It is Disassembled at the Left to Show the Mechanism, and the Lower Group of Celluloid Leaves, or Cards, Which Turn to Announce the Minute

lower "cluster," of 60 leaves, displays the appropriate minute. The springs and gears of the lanternlike timepiece are all concealed in the base.

WINDMILL ACCESSORY USES PLANETARY GEAR

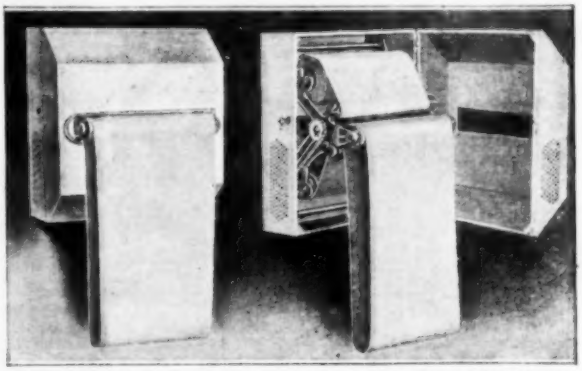


The Odd Gear Arrangement is Shown at the Right Both as Used with a Windmill and as Fitted to the Storage Tank. It is Seen Partly Disassembled to the Left of the Tank; Next, Completely Disassembled; and Assembled for Operation at the Left

A simple mechanism for obtaining reciprocating from rotary motion is now produced by a maker of pumps and windmills. As it contains no connecting rods, and as all moving parts are inclosed and bathed in oil, the operation is unfailing and noiseless. This freedom from vibration and racket recommends it to the farmer, enabling him to install his pump in the basement or on the back porch. When operated by a windmill, the mechanism is equipped with an expanding brake which locks the wheel when thrown out of the wind. The mechanism is also combined with an electric motor and pump, to force water into a tank against pressure. When 100 lb. is reached, the motor is automatically cut out, to be started again when the pressure falls to 80 pounds.

TOWEL CABINET DISPENSES LONG STRIP

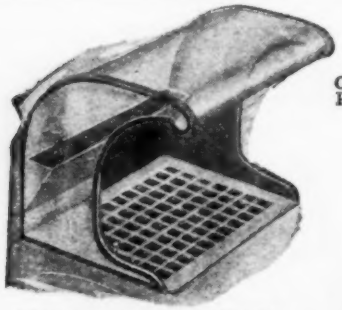
Towels 75 ft. long are in actual use. They do not hang down the face of a skyscraper, however, as imagination might suggest, but are used with an apparatus of recent design, in many public washrooms. Fixed to the wall, one of these cabinets measures about two feet high, two feet wide, and six inches deep, when the door is closed. From a horizontal slot in the door there always hangs a loop of towel. The bulk of the long strip is held on rollers, from which it is pulled through the door as needed. The same motion retracts the soiled portion, and winds it on another set of rollers in a lower, separate compartment. Once carried into this bottom compartment, the soiled portion cannot be pulled out to be used again. Despite its length, the towel strip is laundered easily and more cheaply than individual towels.



The Wall Cabinet is Seen at the Left as Used in a Public Washroom. At the Right are Shown the Geared Rollers Which Retract the Soiled Part of the Strip as the Clean is Pulled Out

Popular Mechanics features will appear in moving pictures issued by Paramount Magazine.

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES



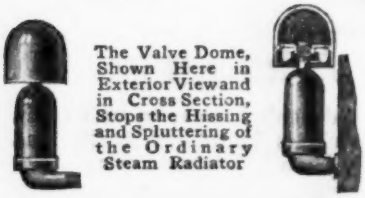
This Hot-Air Register Shield is Fitted with a Removable Water Pan Which Humidifies the Air. The Gutter at the Top Catches the Dust Circulated by the Furnaces

The Little Gas Stove at the Right Is Only 14 Inches High, but is Made of Sheet Steel, and is Said to Cut the Gas Bill in Half. The Top Is a Hot Plate That will Boil or Fry at Any Point

Made in Pairs, and with a Hanger Attachment, These Newest Shoetrees Make It Easy to Keep the Family Footwear in Order

This Kettle of Old-Fashioned Cast Iron Has a Tight-Fitting Top That Holds the Steam. Condensing Here, the Steam Drips from the Concentric Ridges and Bastes the Meat

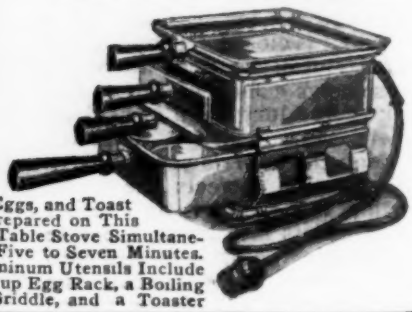
The Paper House Cap and Apron at the Left Are Practical and Economical Substitutes for Those of Cotton. Thrown Away When Soiled, They Never Help to Swell the Household Laundry Bill



The Valve Dome, Shown Here in Exterior View and in Cross Section, Stops the Hissing and Spluttering of the Ordinary Steam Radiator

By Pressing a Pound Print of Butter upon the Cutting Wires, It is Sliced Vertically into 22 Pieces. A Pull on the Iron Frame Then Divides It Horizontally into 44 Pieces

After a Stimulating "Dry Rub" with This Bath Brush, the Hose is Attached to the Tub Faucet. The Water Emerges as a Spray in the Midst of the Bristles



Bacon, Eggs, and Toast can be Prepared on This Electric Table Stove Simultaneously in Five to Seven Minutes. The Aluminum Utensils Include a Four-Cup Egg Rack, a Boiling Pan, a Griddle, and a Toaster

This Attractive Parlor Lamp Becomes an Electrically Operated Phonograph When the Cover at Lower Left is Removed

When the Little Tube of Tooth Paste is Placed in the Handle, and the Cover is Drawn over the Brush, This Piece of Traveling Equipment Resembles, and is Carried Just like a Fountain Pen

This Little Lamp of Blue Venetian Glass Makes a Serviceable Deodorizer for the Sick Room

Rich Gravy is being Poured from the New-Fashioned Bowl Above. Tilted the Other Way, Lean Gravy would be Drawn from the Bottom through the Duct Seen in the Bowl

By Purchasing This Stand and Cover, the Owner of an Electric Iron Provides Herself with a Curling-Iron Heater, Which is Used as Illustrated

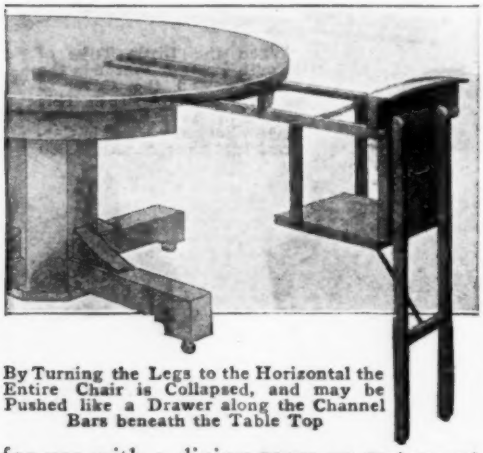
Beads, Bone, and Ornamented Silver Are among the Materials That Give Variety to This Season's Umbrellas

Crackers, Breakfast Foods, and Potatoes Placed in the Glass Jar at the Left are Kept Crisp by the Absorbent in the Aluminum Cap, Seen in Cross Section Above

The Annoyance of Bending the Back and Dirtying the Fingers to Adjust the Ordinary Radiator Knob is Obviated by This Lever-Controlled Valve Which is Turned by the Foot, as Shown

CHAIR SLIDES LIKE DRAWER BENEATH TABLE TOP

A chair which collapses and slides like a drawer along channel bars beneath the table top is a recent invention intended



By Turning the Legs to the Horizontal the Entire Chair is Collapsed, and may be Pushed like a Drawer along the Channel Bars beneath the Table Top

for use with a dining-room or restaurant table. When pulled out of the gap in the flange beneath the table top the two arms of the chair are seen to be elongated and held firmly by the channel bars. The back and the two legs swing to a vertical position, bringing the seat to the horizontal, where it is held by link pieces. In another form of the invention, the chair is attached to the table by only one arm.

SCREW HOLES OF BRASS MADE FOR ACCURATE CARPENTRY

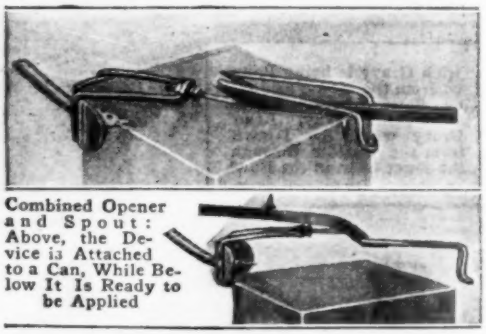
The old joke about the ready-made post holes is no longer funny, for metal "screw

One of the "Screw Holes" is being Driven at the Left. Other Driving Heads and "Screw Holes" for Threads of Varying Pitch are Seen at the Right

holes" are now on the market. The little cylinders are made of brass, encircled by three milled bands, and provided at the end of their conical heads with a centering stud. To receive the blows of the hammer there is used a driving head which screws into the "hole" and is removed when the cylinder is sunk to the proper depth. Before driving the "screw hole," a starting or driving hole is bored in the material.

DETACHABLE SPOUT INVENTED FOR SQUARE-CORNERED CANS

Square-cornered tin cans containing oil or other liquids, are opened and provided with pouring spouts by a device recently patented in Australia. The appliance is clamped diagonally across the top of the container by manipulating a lever. This operation forces the pointed inlet of the spout through the tin at one corner of the vessel, while a sharp pin at the same time pierces a vent hole in the top at the opposite corner. Around the spout is a piece of metal, bent to conform



Combined Opener and Spout: Above, the Device is Attached to a Can, While Below It Is Ready to be Applied

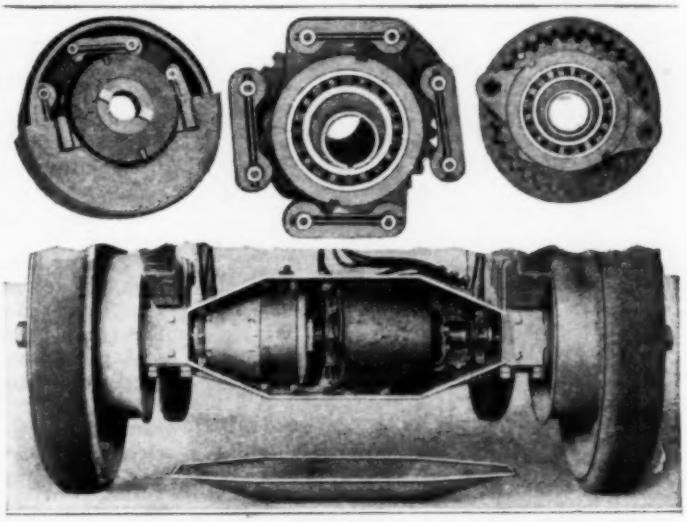
to the shape of the can, and lined with rubber to prevent leakage. Moving the lever in the opposite direction detaches the contrivance.

SUCCESSFUL ALUMINUM WELD IS INVENTOR'S CLAIM

An inventor in an Illinois city, who has been working on the problem for some time and has made numerous experiments, now announces a successful method of welding aluminum. The weld is declared to be at least as strong as the original material, and produces a smooth joint. Samples of the work have withstood many tests. The process is especially suitable, it is stated, for heavy work such as automobile-part repairs, and is equally applicable to the welding of aluminum to other metals. Details of the method are not divulged.

ODD TRANSMISSION IN TRUCK'S REAR AXLE

The transmission problem of the electric vehicle is merely one of reduction from the motor to the driving axle. This is accomplished in a new form of electric-truck transmission by a gear arrangement of extreme simplicity. It consists of a gear with 32 internal teeth, fixed to the axle, and within it a gear with 30 external teeth, held to the housing by four links that permit it to oscillate eccentrically, but not to revolve. Within this gear is an eccentric mounted on the shaft of the driving motor, which is housed inside the rear axle of the truck. The gear unit also contains the differential gears. A feature of this transmission is that seven teeth are always in mesh, instead of the usual two, providing an efficient and powerful drive with the strains well distributed.



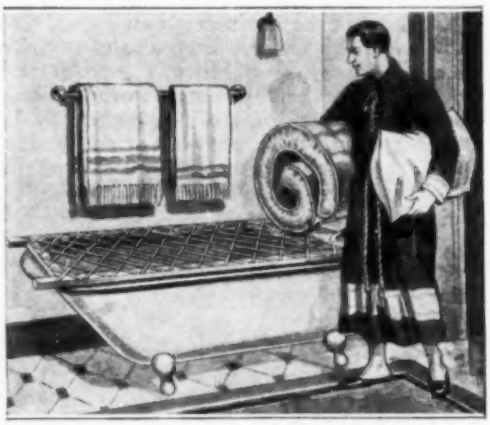
The First Detail View at the Top Shows the Assembled Gear with the Upper Half of the Casing Removed. The Second View Reveals the Links That Keep the Externally Toothed Gear from Turning. The Third Indicates the Intimate Meshing of the Gears. At the Bottom Is a Cross Section of the Axle, with Motor and Gear in Place

HEART OF ANCIENT ELM TREE YIELDS THREE CEDAR TIMBERS

Cutting down an ancient and gigantic elm tree in a Buffalo city park, a few weeks ago, workmen were astonished to find within it three large and unrotted cedar timbers. Their mystifying presence was, and still is, unexplained. A plausible theory was advanced, however, which reminds that the elm, when but a sapling must have stood in the market place of the infant city. Exposed thus to the teeth of horses hitched there by farmers from the outlying countryside, it was protected by the three timbers, strapped to the trunk. As the years slid by, and nobody thought of removing the timbers, they were pressed upon and finally inclosed by the growing tree.

LIGHT FRAME CHANGES BATHTUB TO BED

The difficulty of finding room in the modern apartment for the overnight guest is apparently not confined to America, for a patent has been granted in England for the transformation of a bathtub into a bed. A simple frame, placed over the rim of the tub, supports a flexible netting or fabric on which rests the mattress. The thing is quickly put on or removed.



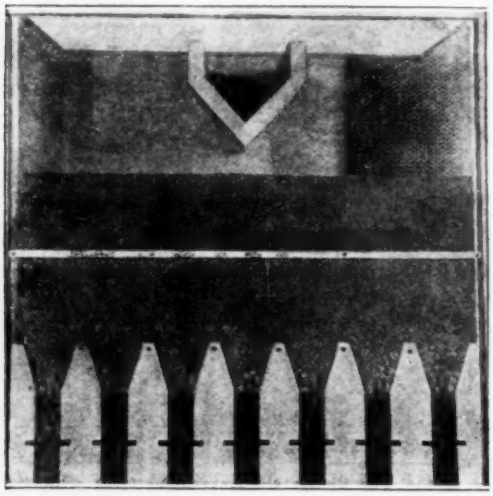
Resting on the Rim of the Bathtub, This Light Frame, and a Mattress Make an Emergency Bed

¶Argentina recently made its bow as a shipbuilding nation when a merchant vessel was launched from a new yard not far from Buenos Aires.

Popular Mechanics features will appear in moving pictures issued by Paramount Magazine.

FILTRATION PLANT EXPLAINED TO VISITORS BY MODEL

To show visitors just how one of the great filter units is built, how it purifies the water, and how it is cleaned when



This Glass-Walled Filter Cross Section, Seven Feet Wide, is Exhibited at the Minneapolis Filter Plant. The V-Shaped Trough at the Top Is Simply a Provision for Overflow during Cleaning

dirty, officials of the Minneapolis filter plant have placed on exhibition a full-sized model. The structure is seven feet long, and is in every way a correct, longitudinal cross section, except that concrete is replaced by wood. Two sheets of wire glass, 44 in. by 88 in., form the front and hold in place the filtering material, which consists of 30 in. of sand supported by 15 in. of gravel. The gravel varies in size, from the smallest to heavy 2-in. stuff, which rests between the ridge blocks. The seven 3½-in. cast-iron risers at the bottom were split by a hacksaw.

BUILD CITY SUBWAY SYSTEM IN BED OF OLD CANAL

Construction of a rapid-transit subway without tunneling operations is made possible in Cincinnati, Ohio, by the existence of the old Miami and Erie Canal. The waterway, disused for many years, runs along the route which the new subway is to follow, and a street at each side further facilitates construction work. The canal is to be drained and deepened 16 ft., and the concrete tubes of the subway, measuring 13 by 14½ ft., will be laid in the trench thus made. After completion they will be covered with earth and parked. The whole city project involves the construction of a modern subway system, similar to that in New York, from the business district to the city limits, at a cost of some six million dollars.

SPICES PROVE VALUABLE AS FOOD PRESERVATIVES

The widespread consumption of fruits and vegetables preserved in vinegar, mustard, cinnamon bark, and cloves is foreshadowed by recent French experiments. The researches reveal that foodstuffs so treated keep much longer in the open air than foodstuffs untreated. Such bactericidal action of spices, heretofore valued chiefly as gastronomic ornaments, qualifies them to replace the dangerous chemical preservatives now banned by law in many countries. Of the substances mentioned, vinegar is found to have the strongest action, with cinnamon bark and cloves a bit weaker. Ginger, white pepper, and Cayenne pepper are strangely inactive.

MAKES KNIVES SAFE FOR USERS BY RESHAPING HANDLES

In the packing industry, where knife blades become covered with blood and grease, injuries caused by the hand of the worker slipping forward onto the blade were formerly quite common. Simple changes in the form of the knife

Knife Handles Provided in Various Ways with Guards to Prevent the User's Hand from Slipping onto the Blade

handles have now been evolved, which, it is reported, have reduced these injuries about 90 per cent. For work which does

not require the blade to be turned edge up, the handle has a knob on the blade end, at the edge side only. If the position of the knife must be changed frequently, there is a knob on both sides. Other forms have either a finger hook or a loop fastened to one side of the handle, or a broad cross guard at the heel of the blade. In most of these, industry has merely borrowed and adapted designs long familiar to hunters and trappers.

FIND RARE AND DEADLY SNAKE IN BUNCH OF BANANAS

Patrons of a prosaic grocery store in a sedate Iowa community had an exciting taste of tropical adventure a few days ago. A bunch of bananas which had been ripening in the store for a week suddenly gave up a strange and brilliant snake, about three feet long and unpleasantly active. Taken in a glass-covered box to a local scl l, the reptile was identified as a bush master, most deadly of South American snakes. Its slender body is pinkish-yellow in color, with a row of large, diamond-shaped patches from head to tail, the latter being black, with stripes of pinkish-yellow. It is related to the better known fer-de-lance, but grows even larger than that six-foot carrier of swift poison. Because of local prejudice against the visitor, it was chloroformed.

MODISTES MAKE FLYING SUITS AS WOMEN TAKE UP FLYING

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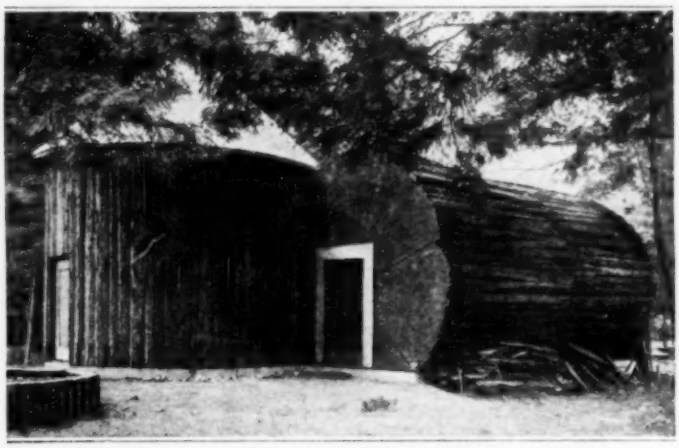
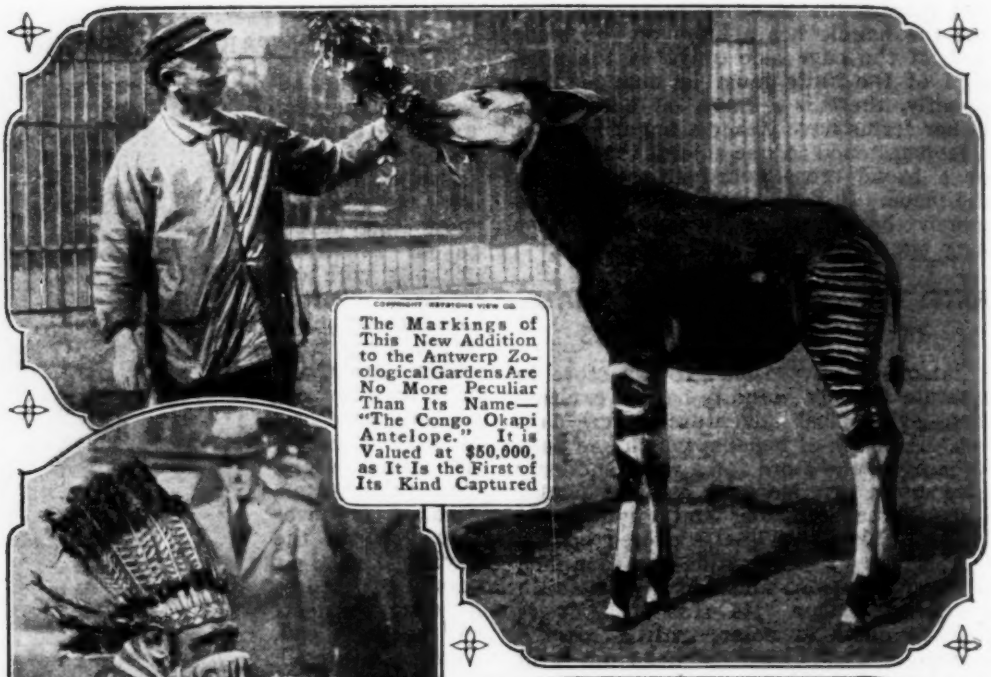
Before the advent of the luxurious closed-cabin airplane, those of the fair sex who ventured aloft were forced to sit in drafty cockpits with oil-smeared controls in annoying proximity. They wore formless flying suits that had apparently been created by a maker of gunny sacks. For this reason, perhaps, few women flew. In the "flying parlor cars" of today, however, protected against oil, wind, and cold, the passengers may wear what they please. The ladies may, and no doubt will, call on their tailors for "chic" flying outfits like the one in the illustration.

SQUIRREL-CAGE COUNTRY HOME BUILT FROM SINGLE TREE

Those who visited the San Francisco Exposition may recall a "squirrel-cage" log cabin constructed, as a placard announced, from a single redwood tree, 300 ft. high and 20 ft. in diameter. Astonished then, they would be surprised now to discover the remarkable American curio playing the rôle of country home a few miles south of Seattle, Wash. They would find that the horizontal section of the log incloses a spacious bedroom, while the vertical part contains a comfortable living room. A dining room and kitchen have been added at the rear; but as even these were made of lumber from the old forest giant, the house still maintains its original distinction of being fashioned, from top to bottom, from a single tree. Exception of course, is made of the foundation.



This Country Home, Once a Feature of the San Francisco Exposition, is Built Entirely of Lumber from One Redwood Tree



The Markings of This New Addition to the Antwerp Zoological Gardens Are No More Peculiar Than Its Name—"The Congo Okapi Antelope." It is Valued at $50,000, as It Is the First of Its Kind Captured

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Taken to London for Exhibition on the Vaudeville Stage, This Educated Monkey One Day Saw One of the Popular Motor "Scooters." Thereafter He Refused to Perform Until His Trainer Purchased One for Him. Above He is Seen in All the Glory of Possession, About to Take a Spin along a Street near His Theater

This Miniature Billiard Table is Built in Perfect Proportion. The Balls are Hit by Tiny Metal Cues, Operated by Rubber Bulbs Held in the Hand

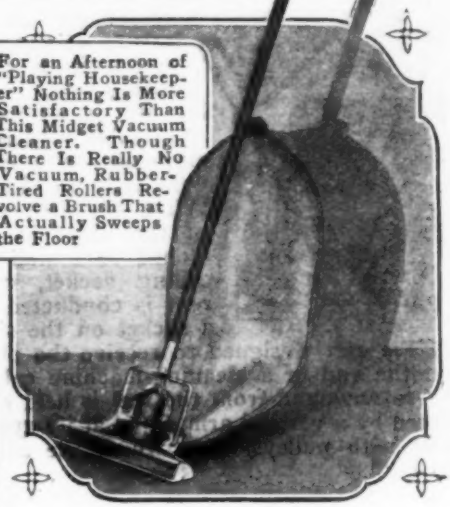
This Belgian Lad, Here Served by the Chef of a New York Hotel, Five Times Crossed the Atlantic as a Stowaway; Four Times He was Sent Back. At Last He was Adopted by an American Family

This Surf Boat Is Just the Right Size for the Small Boy. The Gaudy Coat of Paint Covers a Foreign Wood That Is Strong Enough to Stand Rough Usage, Yet Is Lighter Than Cork, So That the Boat can be Easily Carried About

Orphaned in Alaska When a Baby, Reared There in a Charity School, and Now, at 15, Quartermaster of an Alaskan Power Schooner, This Young American Recently Visited the United States for the First Time

As the Hand Cranks are Turned, the Star Wheel in the Rear Grips the Snow and Propels the Sled. With His Feet the Rider Guides the Third, Middle Runner, and in This Way Steers the Sled

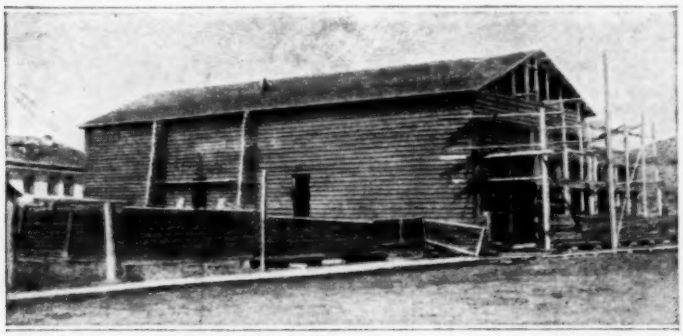
This Chair Makes It Easy to Please Mother by "Sitting Still," for When the Cane Bottom Receives the Child's Weight, a Hidden Music Box Plays Tinkling Tunes. The Little Girl in the Photograph is Winding the Box with the Key Provided



For an Afternoon of "Playing Housekeeper" Nothing Is More Satisfactory Than This Midget Vacuum Cleaner. Though There Is Really No Vacuum, Rubber-Tired Rollers Revolve a Brush That Actually Sweeps the Floor

BUILD MOVIE HOUSE OF LOGS IN ARCHANGEL, RUSSIA

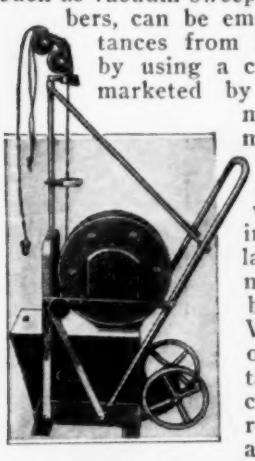
Up in Archangel, Russia, on the edge of the arctic circle, a local amusement magnate has just built a big movie theater of logs—not for any rustic effect, but because they were the only available building material. The inside of the new "picture palace," however, belies its crude exterior, for it is modern in every way, with lounging and refreshment rooms, and the best of electrical equipment.



A Primitive Log House Without but a Modern Theater Within, This Russian Movie "Palace" was Built of Rough Material for Want of Any Other

PORTABLE SELF-WINDING REEL FOR ELECTRICAL CLEANERS

Electrically operated cleaning devices, such as vacuum sweepers and floor scrubbers, can be employed at long distances from fixed light sockets by using a contrivance recently marketed by a middle-western manufacturer. The most important feature of the apparatus is a self-winding reel, holding 100 ft. of insulated cable, which is mounted on a rubber-tired handcart. When the free end of the cable is attached to a wall or ceiling socket, current is conducted to a socket on the side of the cart, designed to receive the plug on the end of a cleaning-machine cable. Wire unwound from the reel is held elevated by a vertical arm, fitted at its upper end with pulleys, over which the cable passes.



CONCRETE HEADGEAR PLANNED FOR SCOTTISH COAL MINE

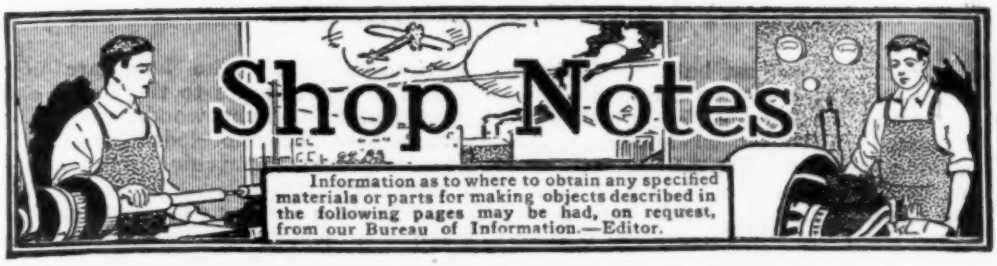
While concrete mine-shaft linings are becoming somewhat common, a headgear of that material, planned for a coal mine in Scotland, will be an innovation, as heretofore such structures have been erected with steel or heavy timbers. The unique building will be 126 ft. high, 41 ft. square, and will stand on a concrete foundation 4 ft. thick. It will be strongly reinforced with steel. The shaft will be lined with concrete. This construction will make the mine practically fireproof, and is expected to lower the cost of maintenance.

PISTON RINGS COMPRESSED BY SIMPLE TOOL

The motor mechanic knows the fitting of piston rings as a rather bothersome business. The operation can be completed in 10 seconds, however, with the aid of a little compressing tool now to be had. A glance at the illustration shows that it is immediately adjustable to rings of all sizes. A squeeze of the pincer handles presses the ring about the piston, which may then be pushed into the cylinder.

RECENTLY FOUND BLACK OPAL WORLD'S BIGGEST GEM

Proclaimed as the largest uncut precious stone in the world, an enormous absolutely flawless black opal, recently discovered in this country, is now in the office of a government official in Washington, D. C. The gem contains approximately 21 cu. in., and weighs 2,572,332 carats. It is valued at $250,000 by the owners. In color the opal combines translucent blues and greens, with a small amount of red. The famous Viennese opal, which was without an equal until the American specimen was found, weighs 1,658,927 carats, but has a number of flaws.


Shop Notes
Information as to where to obtain any specified materials or parts for making objects described in the following pages may be had, on request, from our Bureau of Information.—Editor.

An Engine-Driven Ice-Cutting Machine

By F. D. BURKE

IN building the ice-cutting machine illustrated, almost any of the dimensions given can be altered to meet the requirements of the individual builder and of the material he has on hand, or feels able to purchase.

A gas engine, of 2 to 4 hp., is mounted on a heavy wooden frame, as shown in Figs. 1 and 2. On the rear end of this frame is mounted a two-throw crank made up of iron pipe and pipe fittings. This crank is fitted with a pulley, approximately twice the diameter of the driving pulley on the engine. After the crank is assembled, the pipe parts should be bolted or pinned in the elbows to keep them from turning. In mounting the crank in the bearings, the pulley on the crank should be lined up with the driving pulley on the engine. Two large washers on the crank are then pushed up against the bearings and held in place by bolts through the crank tubes, as shown in Fig. 1.

Two ice-cutting saws are attached to a pair of oak arms, which in turn are mounted on the crank, as shown in detail in Fig. 3. The bearings shown make it possible quickly to detach one of the saws from the middle crank and transfer it to the side crank. The arms are held in place on the crank between washers and bolts through the tubes, as shown. Each arm is provided with a weight, to increase the cutting speed of the saws. The machine is mounted on a bobsled,

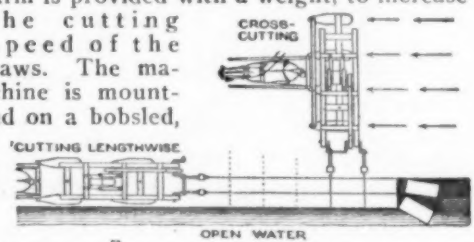


Fig. 4: METHOD OF CUTTING

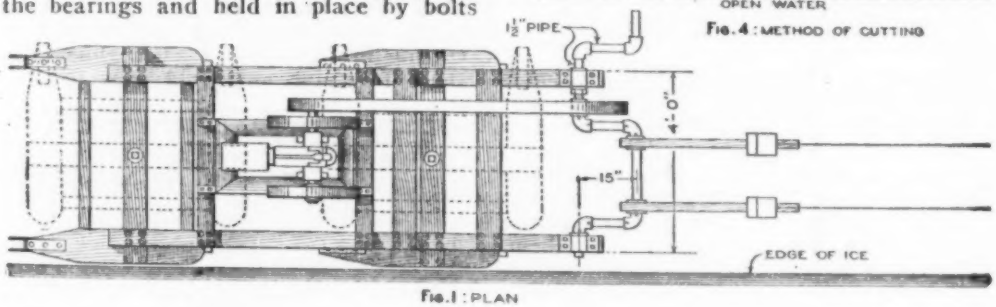


Fig. 1: PLAN

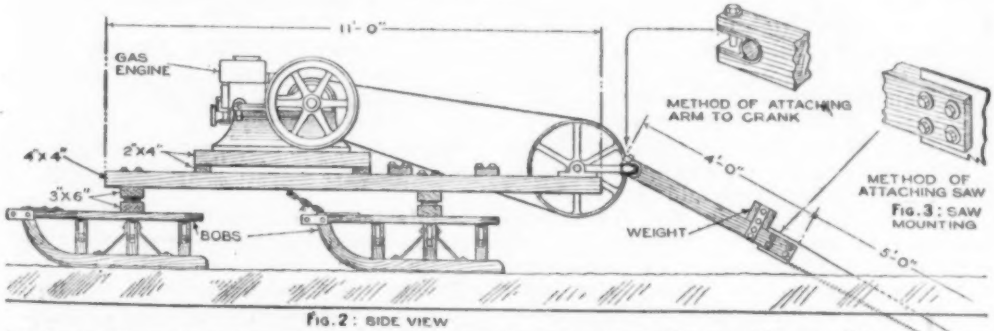


Fig. 3: SAW MOUNTING

Fig. 2: SIDE VIEW

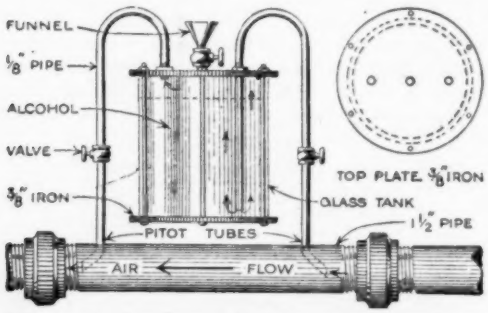
With an Ordinary Farm Gas Engine Mounted upon It, and a Single Horse to Move It, This Machine Enables Any Farmer to Cut His Own Ice at Small Expense

in such a manner that both bobs can be turned at right angles to the frame.

In using the machine, a long channel is cleared in the usual manner. The machine then cuts lengthwise along one side of this channel, as shown in Fig. 4. For crosscutting, the inside saw is removed from the middle crank and transferred to the side crank, and the machine is then set at right angles to the cuts previously made. The bobs are now turned at right angles to the frame, and connected with a stout wooden bar. This arrangement of the bobsleds makes it possible to move the machine along as the crosscutting progresses, without turning and backing for each new operation. The machine should move along at such a rate as to keep the saws at their most efficient cutting angle.

Alcohol Keeps Water in Compressed Air from Freezing

Alcohol vapor is introduced into a compressed-air pipe by the device shown in the sketch, to prevent frost from accumulating inside the pipe when the latter is exposed to freezing temperatures. The



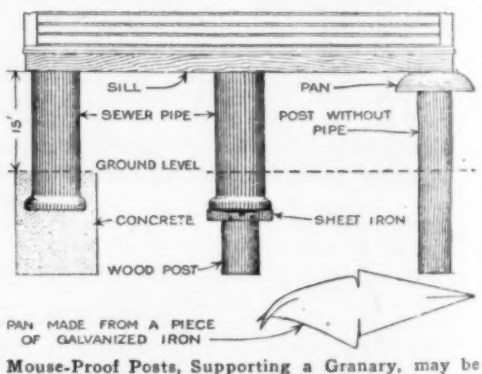
Moisture in Compressed Air is Prevented from Freezing inside the Pipe by This Device, Which Introduces Alcohol into the Line

tank is made of glass, ¼ in. thick, which is sufficient to stand a pressure of 15 lb. per sq. in., or more. Bolts are used to attach the iron top and bottom. Thin gaskets render the assembly air-tight. Before the Pitot tubes are bent, deep threads are cut on the ends that are to be inserted in the air pipe, and bushings screwed on them. The tubes are then bent as indicated, cut off at the proper point, and connected with the pipe, after which the bushings are screwed down tightly. Valves are installed in the tubes to shut off the air while the tank is being filled. Air forced through the alcohol in the tank collects sufficient alcohol vapor to prevent the moisture in the air from freezing. If the device is to be used with high-pressure lines, the cylinder should be made of metal. A piece of 8-in. pipe can be utilized for the cylinder; the top and bottom should be welded to the ends of the pipe. Wood or denatured alcohol, the latter somewhat less poisonous, can be used in the tank.—F. J. Lillis, Indianapolis, Ind.

Foundation Posts Prevent Rodents from Entering Granary

Many bushels of grain are eaten by mice and rats every year, much of which could be saved by building the granary as shown, so that no mouse can get into it. Ordinary glazed sewer pipes are filled with concrete to form the posts, as shown at the left in the illustration, or slipped over wood posts, as in the center. The top of the pipe, or post, should be about 14 to 16 in. above the ground. Mice and rats cannot climb these posts. The building should stand alone, or at least 4 ft. from others, and should not have any projecting timbers near the ground.

In case sewer pipes cannot be had, the posts can be made as at the right, with the same result. A pan is made from galvanized sheet iron, and is inverted and placed over the top of the post. To make these pans, use a square piece of the iron, cutting in from each corner about 5 in. Bend to shape, and fold over the two



Mouse-Proof Posts, Supporting a Granary, may be Relied Upon to Keep the Structure Free of Mice and Rats for an Indefinite Time

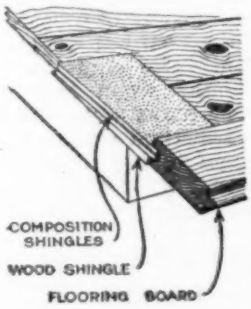
points at each corner to hold it. The pans should be large enough to project about 6 in. from the post all around. Rodents that climb the posts are unable to enter the building, as the pan bars their way.—Chas. Albert, Chicago, Ill.

How to Make Whitewash

A good whitewash, which is widely used for lighthouses, is made as follows: Slack one bushel of lime in boiling water, keeping the mixture covered during this process. Then strain the lime, and add a quantity of brine, made by dissolving one peck of salt in warm water. Next, put 3 lb. of ground rice in boiling water, and cook until the mixture becomes pasty. Add this paste to the lime and brine. Other ingredients are ½ lb. of Spanish whiting, and 1 lb. of clear glue, dissolved in warm water. After all these are well mixed, the whitewash should stand for a week or more, and then should be kept in a kettle, or portable furnace, as it must be heated white-hot for use.

Gauge for Composition Shingles

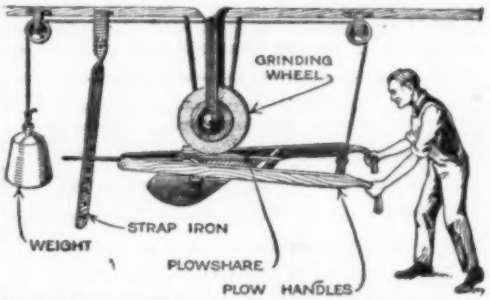
In laying composition shingles, the eaves are usually started with a single course of wood shingles, followed by a double course of the composition shingles. The first of these is usually reversed, that is, turned with the bottom edge upward, and the second is placed in normal position.



To make an even projection, a straight piece of flooring plank, turned with the groove toward the eave, serves a double purpose as a straightedge. The wood shingles are butted against the edge of the groove, while the composition shingles are put to the bottom of the groove. This insures a straight line at the lower edge of the shingles, and gives the composition shingles a projection of ¼ in. over the wooden ones, which forms a drip line that protects all the wood portion of the roof from wetting.—M. W. Lowry, Athens, Georgia.

Rigging for Grinding Plowshares

In grinding plowshares at a small machine shop, a swinging, counterbalanced frame is suspended from the ceiling, as shown. The frame is composed of two ordinary plow handles connected by crosspieces which have slots, so that the share to be ground may be fitted in them. The handles are joined at the end farthest from the operator; a round bar which

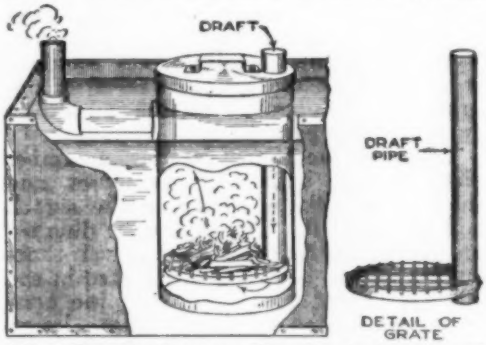


Two Old Plow Handles, Fitted with Slotted Crosspieces for Holding a Share to be Ground, Permit It to be Held at any Angle

projects forward from the joint is inserted in one of the holes in a suspended piece of strap iron. The bar forms a pivot, so that the whole face of the share may be subjected to grinding, whatever the angle at which it must be held.—Frank W. Roth, Neosho, Mo.

A Farm-Tank Heater

A heater for preventing the contents of a water trough from freezing in cold weather is illustrated. The body of the device is a water-tight can, made of sheet iron or other similar material. This is placed in the trough, with its top a few inches above the surface of the water. A length of water pipe, admitted through a hole in the cover of the can, and extending nearly to the bottom, provides draft. The flue is made from two pieces

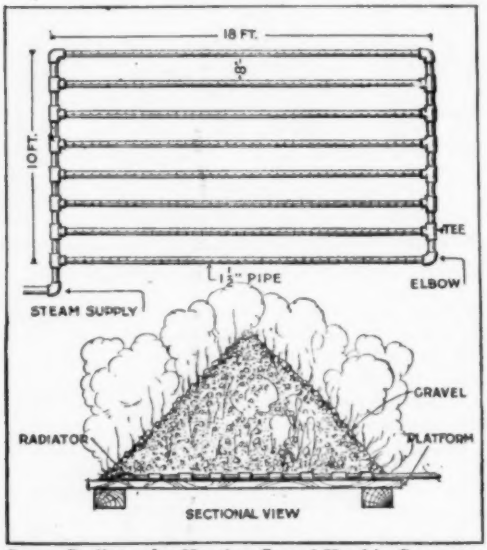


Water-Trough Heater: This Simple Device will Prevent the Water from Freezing in Cold Weather. Wood or Coal may be Used as Fuel

of pipe, joined with an elbow. The grate is attached to the draft pipe, and can easily be removed when it is necessary to clean the heater. Wood or coal can be used as fuel.

Doing Concrete Work in Freezing Weather

The construction of a concrete dam and power house in the northern Adirondacks during the winter was attended by many



Steam Radiator for Heating Gravel Used in Concrete: The Device Made It Possible to Mix and Pour the Material in Freezing Weather

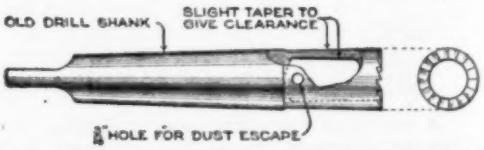
difficulties. The thermometer frequently registered as low as 35° F. below zero. Because of this, it was difficult to prevent the concrete from freezing in the molds, and to get a good bond between fresh concrete and that previously placed. The work and material were often covered with a film of ice, caused by the freezing of mist from a near-by waterfall. It was necessary to remove the ice to obtain satisfactory results. Gravel was obtained from a pit located near the scene of operations, and hauled to the mixer on narrow-gauge cars.

To overcome the difficulties, a lumber platform was built near the mixer, and the steam radiator shown in the sketch laid down on it. The cars were dumped on the platform, and the gravel thoroughly heated before it was placed in the mixer. Water used in mixing the concrete was heated by discharging a jet of steam from a small pipe inserted in the supply tank. A small quantity of common salt was added to the mixture to lower its freezing point. The surface of hardened concrete was warmed by the application of steam before new concrete was poured on it. Stones that were imbedded in the concrete were warmed with steam. Fresh concrete was prevented from freezing by covering it with tarpaulins. A space of about 1 ft. was left between the tarpaulins and the surface of the concrete, and this space was kept filled with steam.

In spite of the severe weather which prevailed while the work was being done, an examination of the structures the following spring failed to disclose any flaws in the concrete.—T. S. Burns, New York City.

Tool Cuts Out Round Wooden Plugs

One day when I was in need of some short wooden plugs, ½ in. in diameter, I made them by means of a tool formed from an old ¾-in., tapered drill shank. The drill had been broken, so that the shank was merely scrap metal. After annealing it in lime, I centered it in a lathe, and turned out the cutter illustrated, afterward filing the teeth on the end, and drilling a 3/16-in. hole for chips to escape. Wooden plugs were cut out by running this tool part way into the end of a board, and then sawing off the board at the end of the drilled portion. The plugs were thus separated from the wood around them. In this way the plugs were made quite quickly, and the method was found so successful that larger tools have since been made from reamers of the type



A Tool Made from the Shank of a Broken Twist Drill Provides a Ready Means of Cutting Out Small Wooden Plugs of a Given Diameter

which have a heavy band of hard steel sweated on.—D. T. Draper, U. S. S. "Bridgeport."

Flood Lighting for Skaters

Experiments with flood lights have shown them to be more suitable for illuminating ice-skating rinks than arc or incandescent lamps. Their use eliminates deep shadows to a large extent, as well as reflections which are likely to blind the skaters. In one case two flood lights were employed to light a large rink. They were mounted on the roof of a near-by building and focused on the surface of the ice. One served to illuminate an area about 900 ft. long and from 75 to 150 ft. wide, while the other lighted a space 150

by 200 ft. It was found, also, that these lights could be operated at less expense than arc or incandescent lamps.—C. L. Meller, Fargo, N. D.

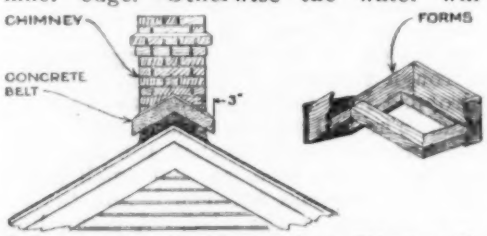
To Save Pieces of Shaving Soap

Shaving-soap remnants should not be thrown away when a fresh cake is put in the mug. The pieces can be melted by placing the mug in hot water. When they have melted, the new cake sinks to the bottom, causing the softened soap to come up around the edges of the cake, and to fill the space between it and the mug. By this means water is prevented from getting under the new cake and rendering it mushy, while all of the old soap will be used with the new supply.—W. H. Kruse, Fort Wayne, Ind.

Drip Belt Prevents Chimney Leaks

Nearly every roof leaks a little around the chimney, through cracks between the roofing and the brick. A simple way to prevent this nuisance is to place a concrete drip belt about the chimney, as shown in the cut. The material will not exceed $2 in cost, and if applied according to directions, the leak will be permanently stopped.

First fasten the roofing well against the chimney on all sides. Then fashion a wooden form for a drip belt, as illustrated, and place it around the chimney. It is very important that the outer edge of the belt should be lower than the inner edge. Otherwise the water will



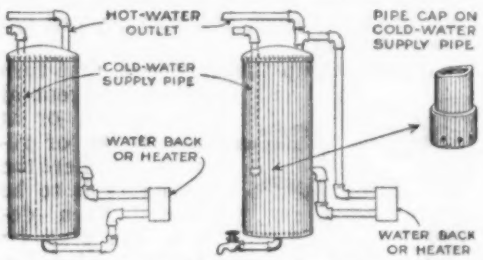
A Concrete Belt Placed around the Chimney will, Except in Very Stormy Weather, Keep Water from Leaking through the Roof along the Chimney

simply run around the belt and on down the outside of the chimney.

The concrete should be reinforced with a little chicken wire, and well tamped into place so as to form a water-tight joint between it and the brick. The mixture must be quite rich—three parts of sand to one of cement is the best proportion to use.—Paul L. Fetherston, Ottawa, Ill.

Pipe Connections on Range Boilers

When pipe connections on a range boiler are as shown on the left of the sketch, the circulation system has two disadvantages. One is the distribution of rust and sediment through the system, and the other is the difficulty of obtaining hot water before the total contents of the boiler have reached a high temperature.



By Changing the Circulation System on a Range Boiler, the Water is Kept Free from Rust

The circulation of sediment is due to the fact that water reaches the water back through a pipe which connects with the bottom of the boiler, where the sediment has settled, and passes from the water back into the center of the boiler. This is prevented in more modern practice, by making connections as shown on the right of the sketch, so that the water is supplied to the water back from the center of the boiler. Here it is free from sediment, and passes upward to the hot-water outlet. As an added precaution, a pipe cap is placed on the lower end of the cold-water supply pipe, with small holes drilled around the edge. From these the water flows radially in a horizontal direction, whereas by the old method it flowed downward with considerable force, and stirred up the sediment.

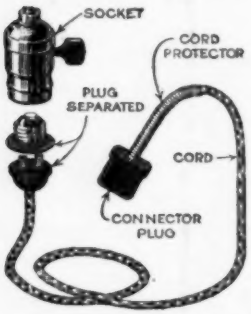
A drain valve fitted at the bottom of the boiler makes it a simple matter to remove sediment. When this is being done, the cold-water supply must be shut off, and the nearest hot-water spigot should be opened. This will admit air to the pipes and to the inside of the boiler, thus reducing the pressure so that the water can flow freely.

The second defect is also remedied by this arrangement. The right-hand view shows how heated water can be made to pass immediately to the hot-water outlet, instead of circulating as shown on the left, and mixing again with cooler water in the boiler.—James W. Cottrell, Hammonton, N. J.

Proper Care of Electric Appliances, Cords, and Connections

Fully 75 per cent of all repairs made on cord-plug appliances may be avoided by observing a few simple rules. If the hints given below are heeded, one will be surprised to see how it cuts down repair bills, besides giving greater satisfaction. The rules are quite easy, and anybody can understand them.

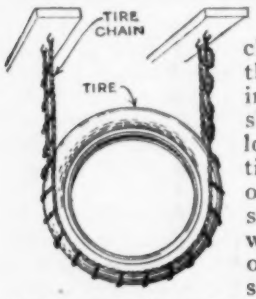
To connect up the appliance, first turn off the current at the socket, or at the outlet or receptacle where the appliance is to be used. Then detach the plug by pulling it apart, and screw the threaded part into the socket, afterward inserting the prongs of the part to which the cord is attached. If the plug is not detachable, screw in the complete plug. Then turn on the current at socket or outlet, and finally insert the connector plug into the iron or other appliance that is to be used.



To disconnect, pull out the connector plug, by its body—don't pull it out by the cord, nor by the cord-protector spring—turn off the current, at socket or outlet; pull out the plug, if detachable, and unscrew the threaded part from the socket; then put plug together again. This procedure will protect the socket.

Tires Hung on Chains for Display

An effective method of displaying an automobile tire, or casing, in a show window is to link together two tire chains and suspend them from the ceiling in the manner shown, forming a loop in which the tire is placed. Two or more tires can be supported in this way, one above the other, in the same set of chains. By a little experimenting one can find the proper sizes to give a good appearance, without letting the tires hang too low or too high.

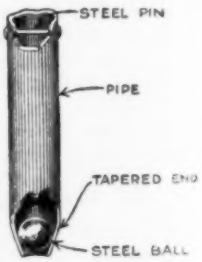


Steel Wool Heats Intake Manifold for Easy Starting

An automobile engine of the L-head type, with exhaust and intake manifolds all on one side, can readily be fitted with an effective manifold heater, which will preheat the mixture whenever the exhaust manifold is hot. Obtain some steel wool from any hardware or paint-supply store, and a quantity of asbestos ribbon, such as used for covering furnace pipe. Pack the wool solidly between the two manifolds, and wrap the asbestos ribbon around both manifolds. The steel wool serves as a conductor of heat from the exhaust manifold to the intake, and the asbestos ribbon, besides holding the wool in place, cuts off the radiation of heat to the outside air.—R. L. Prindle, N. Abington, Mass.

Pump for Cleaning Out Holes Drilled in Rock

A simple pump for removing water, ground stone, and mud from holes drilled in rock can be made from a length of pipe slightly smaller in outside diameter than the holes in which it is to be used. The pipe should be long enough to reach the bottom of a finished bore, and to provide a handle for the operator above the surface. One end of the pipe is tapered by hammering the metal while it is hot. A steel ball, or marble, too large to pass through the hole in the tapered end, is dropped into the pipe from the opposite end. The ball acts as a valve, and should be somewhat smaller than the inside diameter of the pipe, so that small pieces of rock can pass between it and the inside surface of the pipe. A small hole is drilled through the pipe, about 1 ft. from the tapered end, to receive a steel pin, which is riveted in place to prevent the ball from rolling out of the larger end of the pipe. In use, the tapered end is thrust into the drill hole, and the device is moved rapidly up and down. When necessary, it is removed from the hole and emptied. This is done by inverting the pipe. If holes are cleaned frequently while being drilled, the work will progress more rapidly, and the drill is less likely to bind at the bottom of the bore.



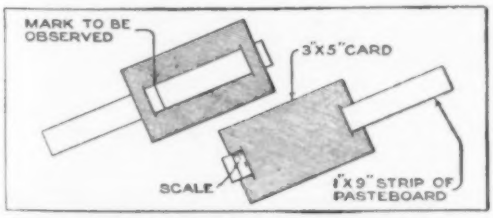
Learn to Read Any Scale by Tenths

By H. KURTZ RANDALL

ONE of the most widely useful things to learn for any mechanic who does precision work, and one which comparatively few take the trouble to master, is to read tenths of a division on a scale. The electrical worker usually learns it, so that he can look at a voltmeter, say, with scale marks for every volt, and "take a reading" of 37.3 volts, or 153.7 volts—where the novice, looking at the same meter, would read merely 37 or 154. The machinist who must lay off a dimension of .97 in. usually considers that he requires a scale graduated in hundredths; but the electrical draftsman who can read tenths may lay off the same dimension just as accurately with a tenth-inch scale—the work involving much less strain on the eyes than using the finer scale. To measure a distance of 1.678 in., and be sure that it is not 1.677 or 1.679, the ordinary workman needs a micrometer. But if the eye is trained to estimate tenths, a hundredth-inch scale and a good magnifying glass are all that is necessary.

A little instrument made of paper, as illustrated, will be of great assistance in training the eye for this purpose. A strip of pasteboard is cut, 1 in. wide and 9 in. long. Beginning ½ in. from the left end, a scale of 100 parts should be laid out and numbered, like the one here shown; or the printed scale can be cut out and pasted to the strip. On the other side of the strip, exactly opposite the 100 mark of the scale, rule a line across the strip.

Now obtain a card, about 3 by 5 in., of a different color from the 1-in. strip. Make two slits in it, exactly as far apart as the length of the scale. Lay the narrow strip, scale-side down, upon the card and pass the ends through the slits. The instrument is now complete.



Two Pieces of Cardboard Are the Only Necessary Materials for Making an Instrument to Train the Eye in Reading Tenths of Divisions on a Scale

For the first lesson, set the strip so that the "10" mark just coincides with the slit in the card, as in the picture. Then turn the instrument over, right to left—not top to bottom—and observe very closely the position of the cross mark with reference to the two slits. Identify this position in the mind with .1 (one-tenth). Then shift the strip to "20" on the scale, and again note the position of the cross mark on the reverse side, remembering it as .2. Proceed in this way until familiar with the appearance of a line placed at .1, .2, or any such part, up to .9, of the distance from the left side of a space to the right side.

Then test the estimating ability thus acquired, as follows: Set the cross mark at any point between the slits, at random, doing this preferably with the eyes closed. Try to estimate which tenth mark is most nearly represented by this position of the cross mark. After a little practice, the correct figure should be named in almost every case. Perfection is not to be expected; the eye training may be considered good if the nearest figure is named correctly in all cases where the actual distance, as read on the scale, is within .03 of the whole. That is, if the setting is actually .77, or .825, the eye should be able to name positively the nearest tenth (.8)—but if the actual setting is .747, or .768, some uncertainty may be expected as to whether the nearest tenth is .7 or .8. It should be remarked in this connection that when the measurements are used afterward in calculation, the error resulting from reading .747 as .8 instead of .7, is a very slight one, while if the actual distance is .727, the use of .8 instead of .7 would introduce a considerably greater error.

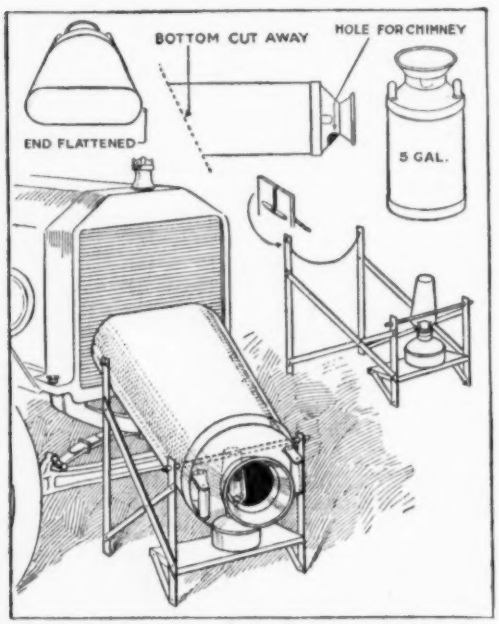
After some experience is acquired through these methods, it will be interesting to try setting the instrument at random, as before, and estimating hundredths instead of tenths, turning the card each time to test the accuracy of the estimate. After some practice at this, it may be possible to estimate in nearly all cases within an error of .02 of the whole distance.

This means that with a steel scale graduated in hundredths, and a magnifying glass, one may measure the length of a piece of metal with an error of less than

.0002 in.—equal to what the ordinary workman does with a micrometer. For it must be understood, to grasp the importance of this work, that the ability of the eye to estimate decimal parts is entirely independent of the size of the whole. The length of the printed scale, for example, is 10 centimeters, but once the decimal parts are fixed in the mind, it is as easy to read hundredths of a .01-in. space (ten-thousandths of an inch) as to read hundredths of 10 cm. (millimeters). This is, of course, limited by the fineness of the vision, or—which amounts to the same thing—by the power of the magnifier available. But the man with the tenth-reading eye has such an enormous advantage, in these days of ten-thousandth-inch dimensions, that a little practice to gain this ability in accurate scale reading is well worth while.

Radiator Heater for Garage

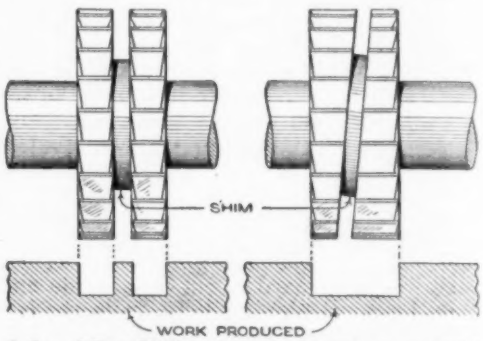
A heater that will prevent an automobile radiator from freezing while the machine stands in a garage is shown in the drawing. The bottom of an old milk can is cut off, as indicated, and that end of the container flattened. A strap-iron stand supports the can, which is held in position by an iron rod that connects the upper ends of the short legs of the stand. The flattened end rests on a wire, strung between the long legs. Heat is furnished by an ordinary lamp, the chimney of which fits in a hole in the can. The lamp is placed on a shelf attached to the short legs. Cold air drawn into the mouth of the can is heated by the lamp, and directed against the radiator by the can, which serves as a flue.



Made from an Old Milk Can, the Device is Used in a Garage to Prevent Freezing

Adjustable Milling Cutter

The sketch shows, at the right, a type of milling cutter that is especially valuable in milling slots, as it may be adjusted for width, and at the same time leaves no fin between the cutters, as is the case if two ordinary cutters are used and shimmed apart, as shown at the left. To produce the cutter described, two ordinary cutters of the same diameter are used, and one side of each is ground on an angle of 10° or more. They are fitted with a key to hold them in alinement, and clamped together on the spindle of the milling machine, with the proper thickness of shim between them to produce the width of slot required in one cut. It is evident that no fin will be left between the cutters, on account of the slant of the opening between them. —S. B. Royal, Philadelphia, Pa.



A Set of Two Milling Cutters, Ground to an Angle and Shimmed Apart, will Produce Finished Slots, of Variable Width

Wire Baskets Separate Chickens in Incubator

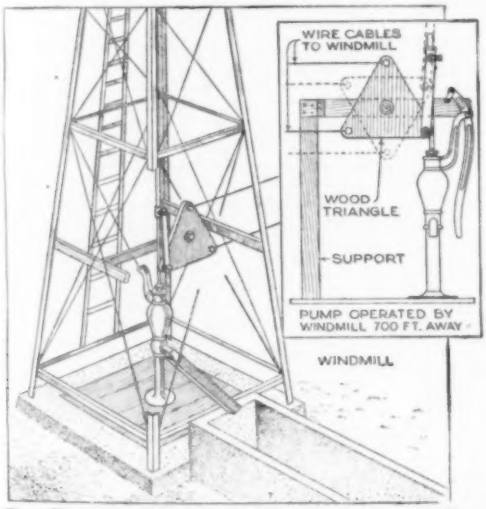
Wire baskets taken from corn poppers are used by many poultrymen to separate chickens hatched in incubators according to pedigree. The eggs are numbered to indicate the different hens from which

they came. On the eighteenth day of incubation they are sorted, and those bearing the same number are placed together in a basket. The baskets are tagged to identify their contents, and put in the incubator. When the eggs hatch, the chickens are banded before those in different baskets are allowed to mingle.—J. T. Bartlett, Boulder, Colo.

Wells Several Hundred Feet Apart Operated by One Windmill

A western farmer has one good windmill, and two wells, about 600 ft. apart. The method by which he used the one windmill for pumping from both wells is indicated in the diagram. The two triangular disks are connected by stout steel wires, which run through holes in a number of posts along the route in order to prevent excessive sag and consequent strain on the bearings of the disks. The latter themselves are made of two thicknesses of 1-in. hard wood, with the grain crossed. The disk which does the driving is located above the pump on the windmill tower, and is connected and disconnected with the windmill shaft, at will, by means of a bolt.

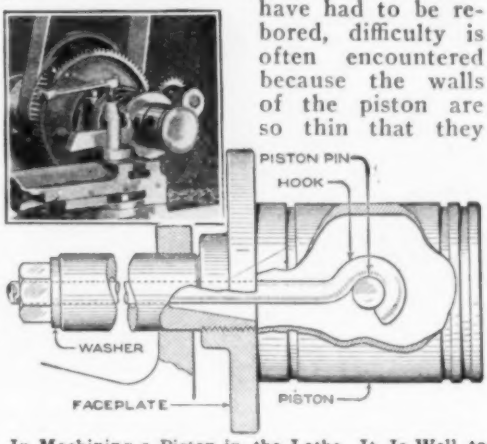
This method of power transmission has also been used in other instances for carrying power from an engine, located in a shop, to a water pump, located under a windmill some distance away. The engine was then used for operating the pump when the wind was not blowing.



Two Rotating Triangular Disks, Connected by Two Long Stout Wires, Form a Practical Method of Power Transmission

Lathe Attachment for Grinding or Turning Pistons

When grinding or turning down new pistons to suit gas-engine cylinders that have had to be rebored, difficulty is often encountered because the walls of the piston are so thin that they spring out of round when gripped in the chuck.



In Machining a Piston in the Lathe, It Is Well to Employ a Device for Holding the Work without Distorting the Piston Walls

This may be overcome by the use of the clamping bar shown in the cut. After putting the piston in a universal chuck and facing off the lower rim, it is placed with this trued surface against the chuck and clamped there by means of the bar. This hooks over the piston pin, passes through the headstock spindle, and is secured in place by a nut and washer on its threaded end. Tightening the nut draws the piston firmly against the faceplate.

Should grinding be necessary, a special faceplate, slightly smaller in diameter than the cylinder bore, is used. This permits the grinding wheel to pass entirely across the face of the piston without striking.—M. L. Lowrey, Livermore, Calif.

Soldering-Flux Spreader

A convenient soldering-flux spreader can be made from a ¼-in. glass tube of sufficient length to reach the bottom of the acid bottle. One end of the tube is heated and flattened until it is nearly closed. To use the device, the flattened end is dipped in the flux bottle, and a finger placed over the other end when it is withdrawn. The acid is released when the finger is removed. A brass tube can be used instead of the glass, if the latter cannot be obtained.—Fred W. Page, Winfield, Kan.

Serving Table Made from Bookrack

A resourceful western woman saves herself many steps by using a serving

An Old Bookcase was Used to Make This Convenient Three-Shelved Serving Table, Which is Mounted on Casters

table made from an old bookcase that had been relegated to the attic as worthless. The case comprised three shelves, and was mounted on short wooden legs. The latter were removed, and casters substituted for them, whereupon the whole was refinished. When food is ready to be served, it is set on the two top shelves, and the improvised table is wheeled into the dining room, where it is placed beside the chair of the housewife, with its open side toward her. The bottom shelf is reserved for dishes soiled during the meal, and after it is finished, the left-overs are put on the other shelves and the contrivance is wheeled back into the kitchen.

An Electric-Lighting System for the Garage

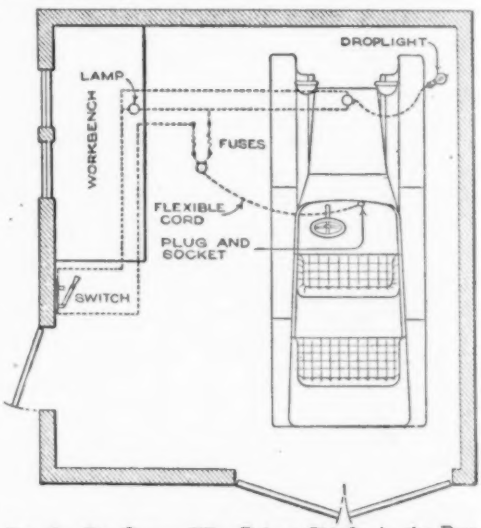
The convenience of electric lights in the garage is best appreciated by those who have had to do without them. But even if there is no commercial circuit available, any car equipped with a storage battery can furnish plenty of light for a reasonable time.

Detachable trouble lamps, while very useful, are hardly enough for the garage. A better plan is a system of overhead wiring, connected to the car battery through a removable plug. (The same socket will serve for a trouble lamp, when on the road.) With this system there is no groping about in the dark, for a switch can be provided at the door, and lights arranged in any convenient way. The plug, on a flexible cord, hangs near the car, and can be connected and removed in an instant.

The permanent wiring should conform to the usual standards for lighting circuits of small capacity, but must not be extensive. Wire should be rubber-covered, No. 14 gauge or larger, on porcelain insulators or in moldings; fuses, same as used on headlight circuit in the car; all fixtures standard, except fuse blocks and lamp sockets, which will have to be of automobile type, since low-voltage lamps are hard to get in standard screw bases. Short circuits are not harmless even on 12-volt storage-battery circuits; and, besides, this same wiring can be used in case commercial current becomes available.

The connection to the car can be made through any kind of socket and removable plug. If the car is already fitted with a dash trouble lamp, the problem is solved. Otherwise, a socket can be fitted on the footboard, or dash, where connection is easily made to the ammeter terminal at the back of the instrument board. Unless the owner thoroughly understands his car wiring, a reliable electrician or service station should be consulted.

Of course, the system must not be overloaded, or used for an unreasonable



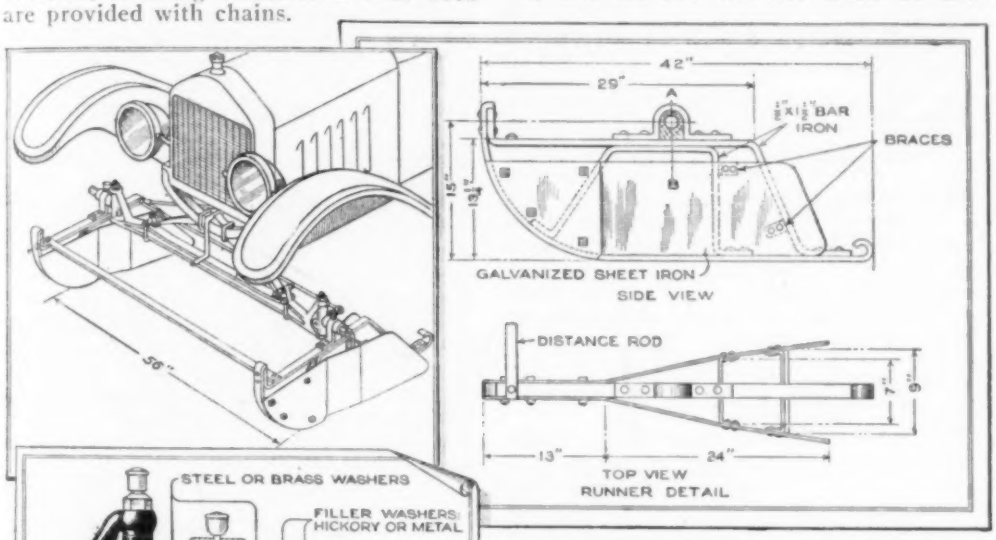
For the Car Owner Who Drives Chiefly in the Daytime, and Whose Storage Battery Therefore Has an Excess of Capacity, a Low-Voltage Garage-Lighting System Is Entirely Practicable

length of time. One or two lamps of not more than 15 cp., a droplight, and possibly a small light at the door, all fitted with suitable reflectors, are ample.

Sled Runners with Plow Attachment for Light Cars

By P. P. AVERY

IN traveling through deep snow with an ordinary automobile, the tendency of the front wheels to pack up the snow in front of them often makes it difficult for the rear wheels to get traction, without slipping until the snow is thrown away by the chains. By providing the front axle with sled runners instead of with wheels, this effect can be eliminated. The runners are purposely designed with a narrow surface so that they will sink through soft snow, and will find or make a hard snow surface near the ground. At the rear of the runners, sheet-iron sides flare out to make a path for the rear wheels on which they can get good traction, it being understood that both are provided with chains.



The Assembly and Detail Drawings Show a Set of Runners Which can be Made from Some Pieces of Iron Bar, and Which will Make Easy Going over a Snow-Covered Road

The runners themselves are formed from heavy iron bar stock, bolted together, and provided with a bearing at the top which fits onto the spindles, from which the front wheels of the car have been removed. This bearing can well be formed of a block of hickory with a taper hole reamed in it to take the spindle, surrounded by a heavy iron strap bolted to the body of the runner. At both inner and outer sides of the bearing should be heavy steel washers, wide enough to bear against the iron strap, so that the bending stress will not have to be taken by the hickory bearing. The two runners should be tied together by a bar across the front, and should, of course, be lined up parallel with each other as is done with wheels.

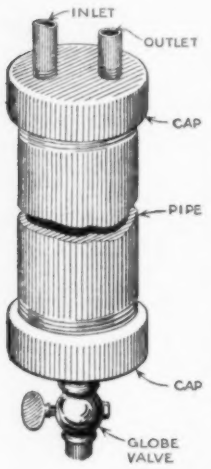
The flare formed on the heavy galvanized-iron sides of the runners acts as a small snowplow. Two iron braces should be fitted across from one side of the lining to the other, as indicated in the detail sketch.

Among the precautions to be observed in constructing the outfit are these: The bearing on the spindle must be a good fit, and all the washers must be held pretty tight against the shoulder by the castellated nut on the end of the spindle. Some looseness must, of course, be allowed to permit the runner to turn for unevenness in the road. The distance rod across the front of the runners should have sufficient flexibility, or looseness at the bolts, to permit one runner to turn a little on the spindle without the other's doing so.

A coat of paint on the iron will help to prevent rust. The wheels can be replaced on the axle in a few minutes, and the runners can be stored in a small space until needed again. Not the least of the advantages of a machine of this type is that the track which it leaves forms a path through the snow for other automobiles.

Removing Moisture from Air Blast

Any person familiar with compressed air knows that water is always present, to a greater or less extent, in the air, and is a great nuisance, especially when the air is used to furnish blast for an oil or gas furnace.

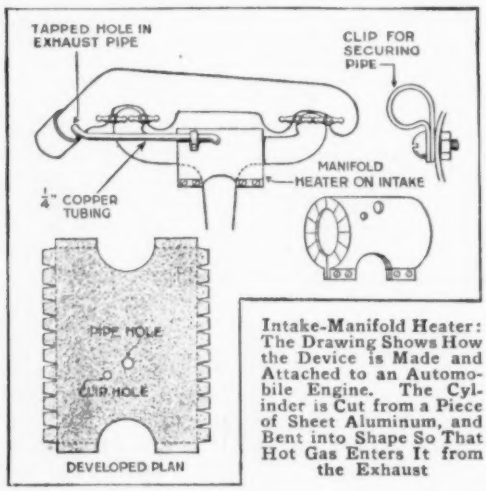


The accompanying illustration shows a device that can be made from standard fittings, and connected on the line in series just ahead of the furnace. It will remove nearly all water without the use of any other trap. However, a common trap may be employed in addition, if desired.

Using a piece of pipe, four to six times the diameter of the supply line, and 1 to 2 ft. long, attach a pipe cap or a blank flange to each end; tap out two holes in the upper cap, as shown, for inlet and outlet, and provide a drain pipe with globe valve at the lower end.—W. H. Steele, Pittsburgh, Pa.

Automobile Manifold Heater

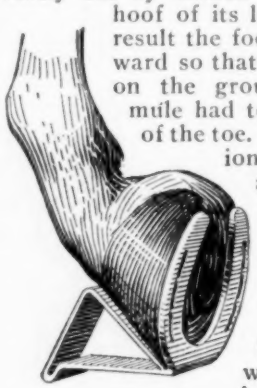
An intake-manifold heater for an automobile engine was made by an eastern motorist from odds and ends found in the garage. The illustration indicates how the device was fashioned. Sheet aluminum was used to make the cylinder that fastens over the manifold. The material was cut to conform to a paper pattern which was fitted in advance. A short length of copper tubing conducts heated gas from the exhaust pipe to the cylinder. The tubing is held in position by a clip attached to the cylinder with a screw bolt. The contrivance is said to lower the gasoline consumption of the car, mileage considered, and to allow the engine to be throttled to a slower speed than is possible otherwise.



Intake-Manifold Heater: The Drawing Shows How the Device is Made and Attached to an Automobile Engine. The Cylinder is Cut from a Piece of Sheet Aluminum, and Bent into Shape So That Hot Gas Enters It from the Exhaust

Shoe for Lame Mule

One of a team of large mules was severely cut by barbed wire just over the hoof of its left hind leg. As a result the foot was drawn backward so that it could not be set on the ground properly; the mule had to walk on the edge of the toe. A blacksmith fashioned the device shown out of a piece of ½ by 1¼-in. steel. It was welded to the mule's shoe where the front calk would have been, and the shoe was then nailed on in the usual way. The mule now walks without difficulty, and with only the slightest trace of a limp.



Removing Boiler Scale with Steam

Boiler scale may be quickly removed by the use of steam. When the boiler is cool, wash the loose mud out, then put the manhole heads loosely in place, and admit sufficient steam into the boiler to heat the scale. Remove the heads, and wash out. The scale will come off in sheets as soon as the water strikes it, due to the fact that while the boiler is steaming, the hottest side of the metal is the fire side, but while cool, the fire side is the cool side—the expansion and contraction being thus reversed, which causes the scale to come loose. Cold water also has a tendency to crack the hot scale.

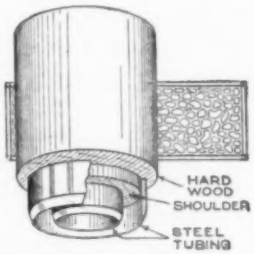
Care must be taken to remove all the loose scale from the boiler, or it may either form a dangerous bank in the bottom of the boiler, or clog the blow-off.—Jack Solon, Natchez, Miss.

Old Cot Made into Creeper

The frame and springs of an old iron cot can be transformed into a comfortable creeper for use by automobile mechanics while working underneath cars. After the legs are removed, a 2 by 4-in. scantling, as long as the cot is wide, is screwed, or bolted, under each end of the frame. Holes bored near the ends of these wooden pieces accommodate the casters taken from the legs. A canvas cover, and a padded headrest at one end of the frame, complete the contrivance.

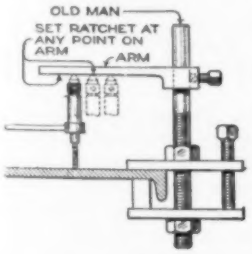
Washer Cutter Made from Tubing

When a small number of felt, or paper, washers is needed, and the expense of a die is not warranted, the work can be done with the shop-made device illustrated. A circular shoulder is cut in the end of a piece of hard wood. Around this is placed a collar, made from a short section of steel tubing, sharpened on one edge. Another collar of the same description and length, but smaller in diameter, is fitted inside the shoulder. The material to be cut is placed on the end of a wooden block, and the cutter is then driven through it.—Arthur A. Richardson, Quincy, Mass.



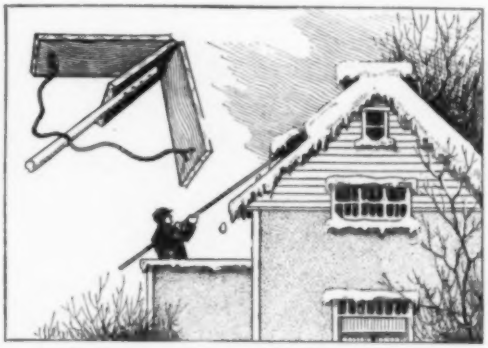
Old Man and Ratchet

A compact and adaptable old man for use with a ratchet drill is shown in the cut. It is especially useful as being attachable to almost any part of a machine where a ratchet and drill is required to be used. The ratchet may be set at any point under the arm, as shown. This arm may also revolve on the old man, so that the hole may be drilled at any point within a circle of a radius equal to the length of the arm. The arm is also adjustable up or down, to accommodate the length of the drill.



Hook Pulls Snow from Roof

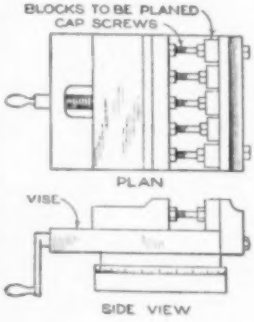
With the easily made device shown in the illustration, snow can be removed from a roof without dangerous climbing. Two boards are hinged together and fastened to the end of a long pole. The "hook" is pushed into the snow with the boards folded against the pole. When the contrivance is pulled downward by the operator, who stands on the ground, the boards extend, and a mass of snow is shoved in front of them. A length of rope prevents their spreading too far.



Device for Removing Snow from Roofs: As the Pole is Pulled Downward, the Boards Extend and a Large Area is Cleaned

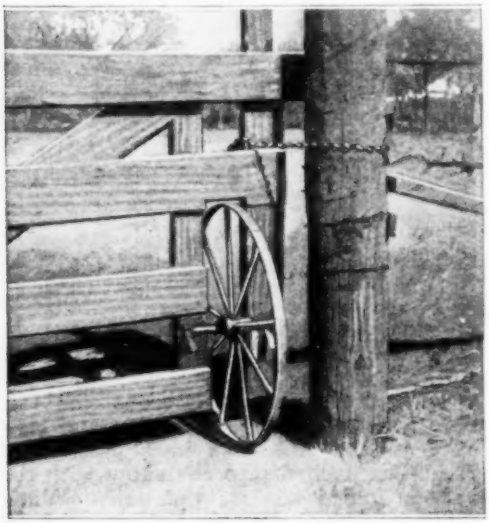
Holding Rough Work in Vise

Our shop had a job of planing 30 small steel blocks, about 2 in. long, and we had no jig suitable for holding them on the shaper. We could not hold more than one at a time in the vise, as they were forged to different sizes; the vise would tighten up on one or two, and the rest would be loose. In order to hold several of the blocks in the vise at once, we placed against each one of them a ½-in. cap screw, with a nut which rested against the vise jaw. Each nut was tightened until the block was held thoroughly tight, an effort being made to get each screw just as tight as the others. The vise was then tightened, clamping each block very tightly. In this way, five blocks at once were handled.—Joseph F. Convery, Worcester, Mass.



Farm Gate Works on Wheel

Using a wheel taken from an old cultivator a farmer built a gate that requires little effort to open or close. The wheel

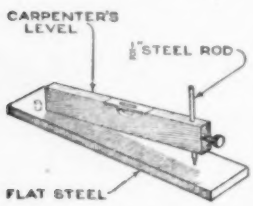


A Wheel from a Discarded Cultivator, Attached to a Farm Gate as Shown, Makes It Easy to Open and Close the Latter

is mounted near the free end of the gate between two vertical scantlings, which are mortised to receive the axle. Iron straps nailed across the openings hold the axle in position. The wheel supports one end of the gate, and acts as a roller when the latter is swung on its hinges, besides preventing it from sagging. The improvement cost little, and was made with only a small amount of labor.—Thomas A. Leadley, Lincoln, Neb.

Leveling Work to be Drilled at an Angle

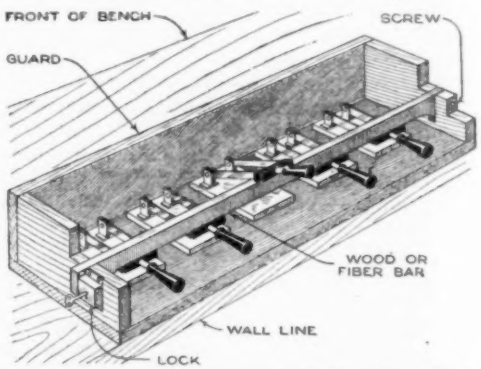
When a piece of flat metal work must be held at an angle on the drill-press table, so that an oblique hole can be drilled, it is not always an easy matter to obtain this angle accurately. A common carpenter's level, fitted with a steel pin as illustrated, will simplify this problem. A piece of ½-in. steel rod is run through one end of the level, and provided with a set-screw to tighten it in any position. The distance from the center of this pin to the farther end of the level should be some round number of inches, such as 10, 15, or 20. The lower end of the pin is filed or turned down to a fairly sharp point, which should be exactly centered.



If the work is to be drilled at an angle, for instance, of 10°, and the distance from steel point to farthest end of level is 20 in., the level is set as follows: From a handbook, the tangent of 10° is found to be .1763. Twenty inches multiplied by the .1763 gives 3.526 in., which is the distance the point of the pin must come below the bottom of the level. When the pin is fastened in this position, and the work clamped to the drill-press table, the level can be placed on the work, and will show immediately whether the angle at which the work is set is the correct one. If not, adjustments are readily made.

Lock and Protector for Switches

The electrical worker who has on his bench a row of knife switches, controlling various test circuits, may desire a simple method of locking these switches so that each one remains as set, open or



By Means of a Long Bar and a Cabinet-Door Lock, It Is Possible to Prevent Meddlers from Interfering with the Row of Knife Switches

closed, until thrown by the person carrying the key.

The arrangement illustrated involves the use of a bar of hard wood, or fiber, slightly longer than the length of the row of switches. One end of this bar is hinged on a screw so that it can be swung up to a vertical position. The other end falls into a slot provided with a small lock of the type used for cabinet doors. This lock is mounted so that the bolt projects into the hole in the long bar, thus preventing its being raised until the device is unlocked.

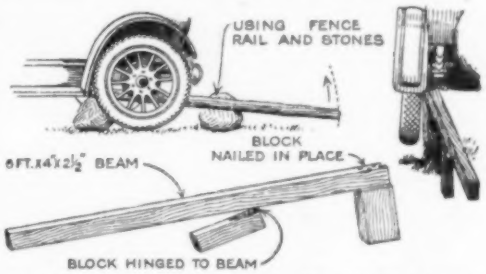
The bar must be located so that, when

the switches are closed, it will be in contact, or nearly in contact, with the bars of the knife switches, to keep them from being raised. The horizontal position of the bar should be determined so that it will be equally effective in preventing the closing of any switch which is left open when the bar is locked. It is well to set up a board between the switches and the rest of the bench to serve as a guard.

Quick-Operating Jacks

The most common suggestion, for jacking up a car in the absence of the regular type of ratchet or screw jack, is to obtain a fence rail. Many motorists, however, do not even understand the proper use of fence rails for this purpose. As an explanation of the use of such a piece of planking, for jacking out of holes or for tire removal, the upper sketch shows how the work is accomplished with the least manual labor. Two large stones, or chunks of wood, are used with the rail. One stone or block is placed beyond the axle; this is the fulcrum for obtaining the desired leverage. The second block, or stone, is placed under the other end of the rail, after the car axle is lifted to the desired height.

A modification of the idea, which is used by a busy farmer, consists in using a long beam with a block of wood nailed at one end. At the middle of the length of the bar is a strap hinge with a short piece of beam arranged to swing flat against the long piece. By merely pushing the lever under the axle, and giving a direct lift on the extreme end, the hinged member is swung out, and the job is done.



As a Quick-Acting Jack, for the Motorist Not Averse to a Little Muscular Effort, the Simple Device in the Lower Sketch Is a Great Success

Portable Pot for Bearing Metal

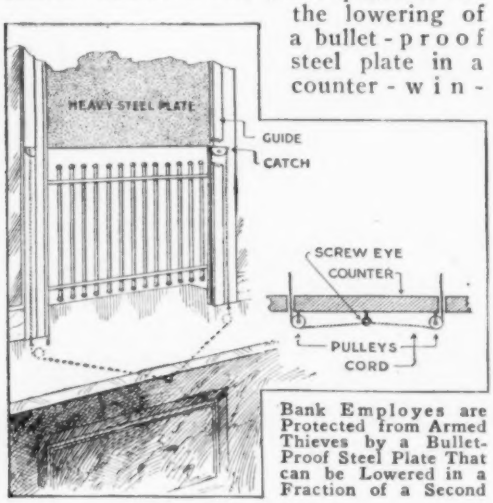
A manufacturer of machinery has found a way of saving time by converting a stationary type of electrically heated metal-melting pot into a portable, tilting outfit. The pot, which is about 10 in. high and 15 in. in diameter, is supported by means of bands on a shaft, the whole in turn being supported on a small hand-power truck. This can be taken to any part of the shop, and a considerable radius may be covered by the provision of a long, heavy, flexible cable, arranged for connection to the electric circuit at various points.

Bearing metal is heated in this outfit, and is applied directly at the location where it is required by simply tilting the pot. Two time-consuming features are overcome—the walking back and forth to a stationary melting pot, and the dipping of the metal from it, and lifting it over the top. The pot used is of the immersion type, the electric heater units being housed in a cylindrical seamless-steel casing which is immersed in the metal to be melted. The current required for a pot of this kind and size is equivalent to that required for fifteen 100-watt lamps, or a 2-hp. motor.

One-Hundred-Pound Standard Bench-Type Electric Pot Used for Melting Bearing Metal: The User Mounted This on the Small Truck So That the Metal in the Pot could be Carried Directly to the Work

Steel Plate Protects Bank Clerk

Among the devices suggested for protecting bank cashiers and clerks from armed robbers is one which provides for the lowering of a bullet-proof steel plate in a counter-window casing. The plate is held in its elevated position by two semicircular catches made of strap iron. A cord attached to these passes through holes in the counter to a point where it can be reached easily by a person behind the window. When this cord is broken, the catches release the plate, which descends by force of gravity. The contrivance prevents the thief from snatching valuable papers while the clerk gives the alarm.



Bank Employes are Protected from Armed Thieves by a Bullet-Proof Steel Plate That can be Lowered in a Fraction of a Second

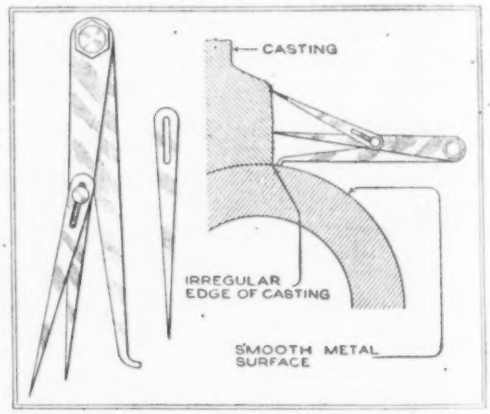
Poultry Silo Made from Barrel

For feeding greens to poultry in the winter, a silo made from an old barrel is a practical device. A hole is cut in the side of the barrel, a few inches from the bottom, and covered with a hinged door. The barrel is placed on a low platform, and alternate layers of greens and straw, the latter mixed with cracked grain, are packed tightly in the vessel. A weighted lid is placed on top of these. When the door is opened, and fastened in that position, chickens can pull silage out of the hole. The contents of the barrel are forced down by the weighted lid as material is removed.—G. H. Dacy, Washington, D. C.

Greens are Fed to Poultry in the Winter by a Silo Made from an Old Barrel

Fitting Castings to a Metal Surface with Hermaphrodite Caliper

When a rough casting has to be fitted to a boiler, or other smooth metal surface, the ordinary way is to rub chalk on the casting, rest the caliper leg against the smooth surface, and scratch a line around the casting, far enough up on it so that, when dressed to the line, irregularities will have been removed. If the lower edge of the casting is quite rough, it is hard to do accurate work in this way, as the end of the caliper leg tends to follow the irregularities in the casting.



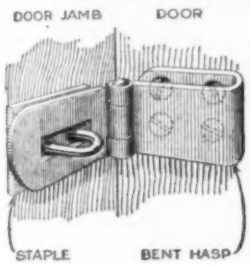
An Extra Leg Attached to the Hermaphrodites Is an Aid in Fitting Castings to Machined Metal

A way out of the difficulty is to attach an extra divider leg to the divider leg of the tool, providing a slot and screw for adjustment. The leg is then adjusted so that it bears against the casting surface above the regular divider point, and steadies the tool so that it can be run along the work evenly, by merely seeing that both divider points are kept in contact with the casting. The caliper point will not be in contact, but will remain at a constant uniform short distance from it, which is to be preferred, since the surface of the casting, which guides the im-

proved tool, is much more likely to be fairly straight and even, than the edge of the casting, which would have to guide the ordinary tool.

It will be found advisable to have the extra point sharp enough to make a mark on the chalk, as it will then be easier to tell that both points are in contact with the iron, than it would be if only the lower point was sharpened. The opening of the calipers will be small in cases of this kind; the distance between the divider points should be rather large, for accuracy.

Hasp Screws Made Inaccessible



To prevent the removal of a hasp from a door with a screwdriver, bend the device, after it is attached, as indicated in the sketch. The screw heads are then inaccessible.

Corrugated Cardboard for Spacing Wood Paving Blocks

Ordinary corrugated cardboard strips, 1¼ in. wide, are being used with good results to keep wood-block pavements from bulging. Cardboard was first used in an effort to find something that could be used as a spacer between plain rectangular blocks which would permit them to expand; strips of wooden lath had proved unsatisfactory in tests, as the blocks

Corrugated Cardboard is Found to Be a Successful Material for Spacing Wood Paving Blocks, as It Is Sufficiently Tough and Very Elastic

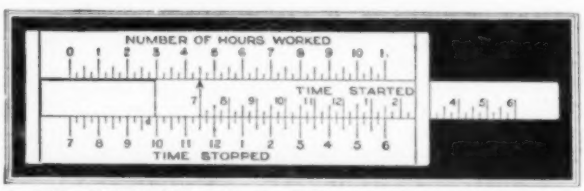
buckled whenever they absorbed water, owing to swelling of the wood.

The board used is single-faced. It is laid across the street from curb to curb, and pitch is then squeezed into the joints to fill them to one-half their depth. Sand fills the remaining space, and the pavement is immediately ready for use.

Ordinarily this cardboard comes in rolls, 250 ft. long and 36 in. wide, and can readily be cut into strips 1¼ in. wide.—George F. Paul, Chicago, Ill.

Slide Rule Figures Shop Time

The illustration shows a slide rule made by a shop timekeeper for the purpose of figuring quickly and accurately the number of hours which should be credited to any employe. There are one sliding scale and two stationary ones, all alike except that the figures on the upper scale are different from those on the lower two. These scales represent hours and quarter-hours.

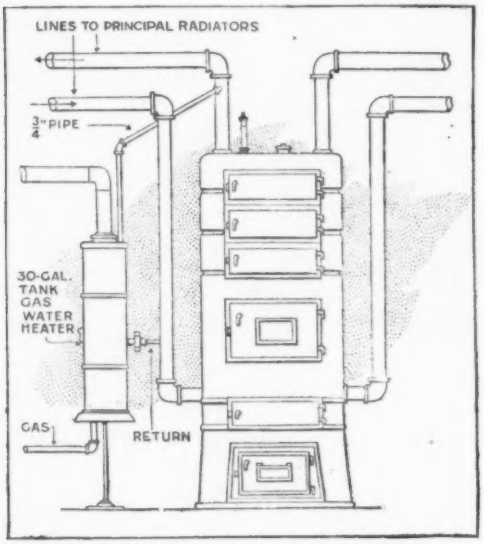


A Slide Rule, Which can be Made in a Few Minutes from Scraps of Cardboard, Computes Exactly the Number of Hours between Starting and Stopping Time of Any Employe

To figure the time worked, place the mark on the center scale, which represents the time of starting, against the mark on the lower scale corresponding to the time of stopping. The arrow will then point to the mark on the upper scale which indicates the number of hours worked. For instance, if a man started work at 9:30 a. m., and worked till 2 p. m., the slide is placed at the point illustrated, and the arrow then points to 4½ hr., which is the correct time. If time is to be counted out for a lunch hour, all that is necessary is to make the two lower scales so as to leave out the lunch period. Thus, if no time is to be counted between 12 and 1, then the figure 1 should be placed at the same mark as the figure 12, the figure 2 at the next hour mark, etc., thus shifting the remainder of the figures one hour to the left.—Louis M. Case, Morrisville, Pa.

Gas Water Heater as Auxiliary to Furnace

By attaching a gas water heater to the principal radiator lines of a residence hot-water heating system, the latter can



An Ordinary Gas Water Heater, Used Instead of the Boiler, Operates a Hot-Water Heating System

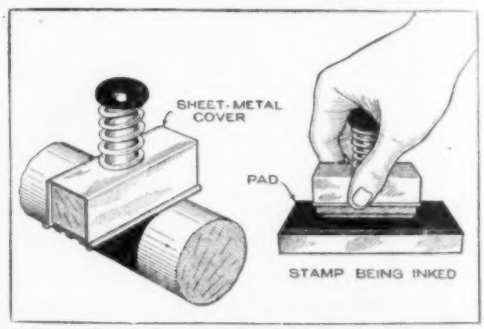
be operated without using the boiler. The outlet pipe of the heater is connected to the radiator supply pipe at any point between the boiler and the first radiator, while the heater inlet is connected to the radiator return pipe. Only the water in the lines and radiators to which they lead will be circulated by the heater. The contents of the boiler will remain stationary. Since the amount of water used is small, the gas consumption will not be large. This method can be used all winter, if desired, though it is especially suitable for supplying a small amount of heat during the spring and fall, on days when the weather is not cold enough to warrant a fire under the boiler. It is possible to use the heater to heat water for household purposes, while it is connected with the radiator lines, but this is not advisable, because of the dirt in the latter.

Pure Aluminum Readily Worked with Carpenters' Tools

Tools suitable for working other metals are not adapted for use on pure aluminum, as many have discovered. However, excellent results can be obtained with ordinary carpenters' tools, set and sharpened for use on hardwood. Planes will work satisfactorily on aluminum, provided the piece is not over 1 in. wide. The material removed resembles hardwood shavings, and the tool leaves a bright, smooth surface. While files do not give good results, a coarse rasp is an excellent instrument for use on rounded ends, or irregularly shaped pieces. Wood chisels may be employed for making mortises, though it is not advisable to use one over ¾ in. wide. Parts that cannot be reached with a plane can be finished with a scraper, adjusted for hardwood, while fine sandpaper quickly produces a desirable semidull finish. In some respects aluminum is more easily worked than hardwood (because there is no grain in the metal), and unless the metal is impure, tools retain their sharp edges as long as, and sometimes longer than, when used on wood.

Using Rubber Stamp on Curved Surfaces

It is difficult to use an ordinary rubber stamp on a cylindrical surface because the ends of the stamp will nearly always slip and blur, or print too heavily or not heavily enough. The illustration shows how a stamp may be mounted for use especially on cylindrical work, such as broomsticks or round pasteboard boxes. A piece of sheet brass, or plated steel, is bent to cover loosely the top and sides of the stamp. The edges of the metal are rolled back so that the fold is in line with the face of the rubber type, or slightly above it. The straight handle is provided with a coil spring, which keeps the metal form down against the stamp mounting. The metal form is



A Sheet-Metal Cover for a Rubber Stamp, Together with a Coil Spring on the Handle, Provides Means of Making Uniform Impressions on Cylindrical Surfaces

grasped by the thumb and finger, while the handle engages the palm of the hand. To ink the stamp, pull back the metal form and ink as usual; to imprint upon

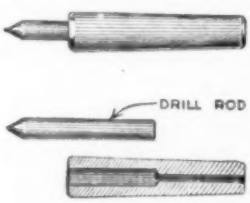
the round surface, hold the stamp by the metal form only, not touching the handle. The spring should be strong enough to insure approximately equal pressure on all parts of the stamp, thus producing an even impression.—Harry E. Gifford, Medford, Mass.

Engine Exhaust Provides Sand Blast

The exhaust pipe of a gasoline engine, if brought out to a horizontal position, can be converted into a sand blast by inserting in it a tube that is connected with an elevated sand box. A small quantity of sand collects in the pipe between exhausts, and is expelled with considerable force when the gases are released.—Chester Cook, McMinnville, Tennessee.

Lathe Center for Small Work

The sketch shows a lathe center made for use in turning small rods, where the regular center would be in the way when the cutting tool reaches the end of the work.



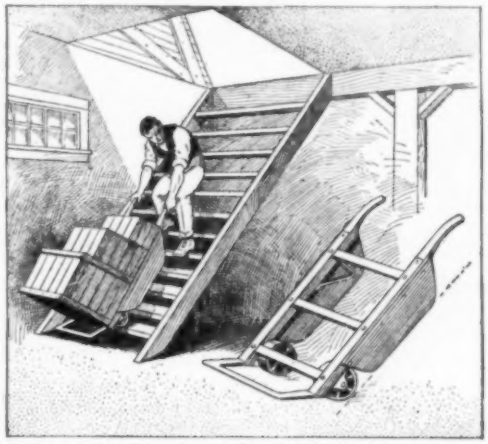
A piece of steel is turned and tapered to fit the lathe-center holes, and drilled to take a length of drill rod, which should be a drive fit. A smaller drill is run entirely through, to provide an opening for driving out the small center when replacement is necessary. The center should be pointed while in place on the live spindle, and then hardened; if a center-grinder attachment is at hand, it may be accurately ground after hardening.—H. H. Parker, Oakland, Calif.

Two Ways of Spoiling Taps

Taps are rather delicate tools, as every metal worker knows to his sorrow. There are two ways, among many others, in which taps are often rendered useless. One is to turn them with a monkey wrench instead of the regular tap wrench. This results in applying pressure at one side, and brings a bending strain on the tap, which very easily breaks it. The other is to use taps in cored holes in castings without first cleaning out the holes with a flat drill to take off the hard, gritty scale. This scale or skin is exceedingly hard on cutting tools of all kinds.

Truck Skids for Use on Stairways

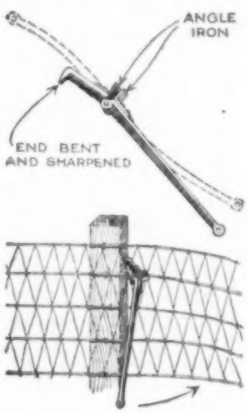
Two runners nailed to the sides of a two-wheeled hand truck make it possible to slide the truck, with a load, up or down an ordinary stairway. The runners, made from two boards rounded at the ends, should be wide enough to prevent the truck wheels from dragging on the steps. The device is especially useful in moving furniture and packing cases from the street into the first floor of a residence.



Difficulty in Moving a Hand Truck up or down a Stairway is Considerably Reduced by Providing Runners Back of the Wheels

Buggy-Top Brace Wire Stretcher

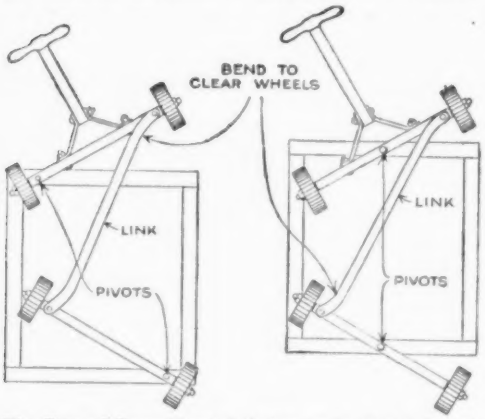
A convenient and serviceable wire stretcher was made from an old buggy-top brace and two pieces of angle iron. The brace was cut about 6 in. from the joint, and this end bent and sharpened as shown, leaving the other end long enough to provide good leverage. Small pieces of angle iron were then riveted at each side of the joint.



To use the stretcher, grip the wire between the angle irons, set the sharpened point against the post, and pull. The wire is held taut with one hand while the staple is driven with the other.

Truck for Turning in Small Space

In making small trucks to haul boxes or barrels around a factory, it is often important that the truck should be able to turn sharp corners. For this purpose, both the axles may be pivoted, and connected by a single diagonal link, as shown.



The Use of Two Pivoted Axles on a Hand Truck Gives It a Short Turning Radius, at the Sacrifice of Some Stability

Of the two methods illustrated, the one at the left gives the shortest turning radius, but has the disadvantage of placing a heavy strain on the joint between the tongue and the front axle, which must therefore be well braced if this method is used. The truck frame must also be designed for this kind of support. The construction at the right does not give as short a turning radius, but it makes a more solid truck.

In either case, the load must be placed near the center, as there are only two points of support; at both these pivot points the bolts must have nuts screwed up tight enough to prevent tilting when the load is a little unbalanced.—Harold E. Benson, Boulder, Colo.

Exhaust Gas Heats Mill

Hot exhaust gases expelled by a gasoline engine are utilized to heat a flour mill in a northern state. An old steam boiler is mounted vertically on a concrete foundation in the basement of the building, with its upper end a few inches below the floor above. Surrounding the boiler is a concrete wall, reaching from the foundation to the underside of the floor boards. Directly over the boiler is a register. The exhaust pipe enters near the bottom of the boiler. The hot gases circulate around the flues, and eventually leave, when cooled, through an outlet pipe, located in the bottom opposite the inlet.

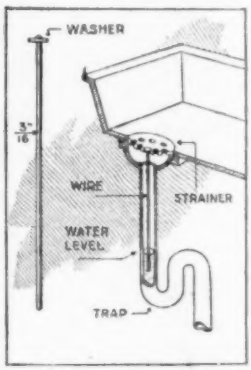
The air admitted by holes in the foundation passes through the flues, in which it is heated, and flows into the mill through the register. A cut-out in the exhaust pipe makes it possible to divert the gases from the boiler in warm weather.—Paul L. Fetherston, Milton, Wisconsin.

Sanitary Waxed-Paper Bread Board

Cut 50 sheets of waxed paper, of the same width and a little longer than the bread board. Draw them over the ends and tack securely, smoothing out all wrinkles and pulling the sheets till they are stretched tightly. When ready to make bread, tear off the last sheet used, and the board is clean and free of dust. When the last sheet is removed, the short tacks can be pulled out and another lot of sheets put on. The time saved in washing and scraping the board is worth the cost of the paper and the trouble of tacking it on.—H. F. Grinstead, Columbia, Mo.

Silencer for a Noisy Waste Pipe

The waste pipe from a kitchen sink may make a persistently disagreeable noise when the stream of water running into it is small enough to be broken up, or to fall in drops from the center of the strainer.



A particularly annoying case of this kind was effectively cured in the manner shown in the accompanying sketch. A stiff wire, with a small washer riveted on one end to form a head, was cut to a length which would reach from the center of the strainer to a point a little below the water level in the trap. The wire was then let down through the central hole in the strainer, and allowed to remain there, hanging by the head.

Water, which otherwise would drip from the strainer and resound in the pipe, will run down the wire silently into the trap.—Charles F. Merrill, Hopedale, Mass.

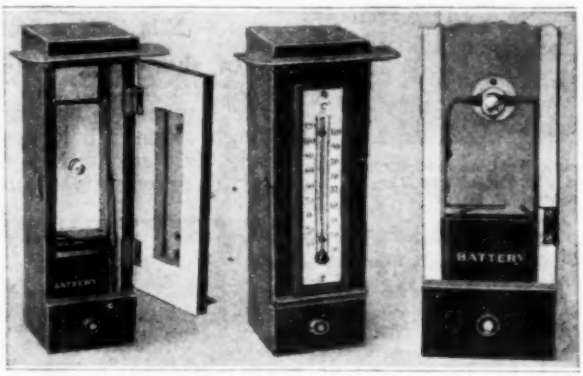
Amateur Mechanics
Information as to where to obtain any specified materials or parts for making objects described in the following pages may be had, on request, from our Bureau of Information.—Editor.

An Illuminated Thermometer Case

By W. J. McGUFFAGE

A GREAT convenience on cold nights is a thermometer which can be read in the dark without holding a lamp to it. The photograph shows how an ordinary thermometer, having a frosted-glass face, was mounted in a box together with a common flashlight battery and bulb, so that pressure on the button below the thermometer illuminates the whole instrument. The light shines unobstructed through the glass face, except where the mercury column and the markings appear dark against the light background.

The completed box is 11¾ in. high, 3½ in. wide, and 3½ in. deep. The door, which covers most of the front side of the box, is hinged, so that it can be opened to renew the battery or bulb. A slot, about 5¾ by 1½ in., is cut in it, and the glass thermometer is mounted in this slot, being fastened to the rear of the door. The exact size of the slot will, of course, vary as it should be made to fit the thermometer. A small piece below the door is fastened permanently to the rest of the box, and a small push button is then mounted in it, being placed in the center directly under the thermometer.



In the Center is Shown the Thermometer Case as Mounted, and at the Right and Left the Internal Construction and the Wiring

Against the back of the box is a porcelain miniature lamp base, and around it is placed a reflector made by cutting a piece of tin from a can, and bending up the piece, as shown in the photo at the left. The reflector may be held on by inserting the bulb in a hole bored through the tin before screwing the bulb into the socket. Underneath is placed a three-cell flat-type flashlight battery, and two small strips of spring brass are fastened with screws to the sides of the box, so that they make contact with the two springs on the battery. It will be found most convenient to fasten these contact springs to the sides of the box before the latter is assembled. The bulb used is, of course, one designed for a 3-cell battery, or for about 4½ volts. The push button, the brass springs, and the lamp are all connected in series. Proper care should be taken that good contact is made at all points, as this is very necessary in all low-voltage wiring.

After the box is assembled and sandpapered outside, it should be given several coats of dark brown, weatherproof paint. The door should be provided with a small hook, or hasp, to keep it closed. A good place to install the thermometer is just outside the door on a porch. If desired, the instrument can be set outside a window with the button placed inside the window, and wired to the wall. In this way it would be unnecessary to leave the room to obtain the outside temperature.

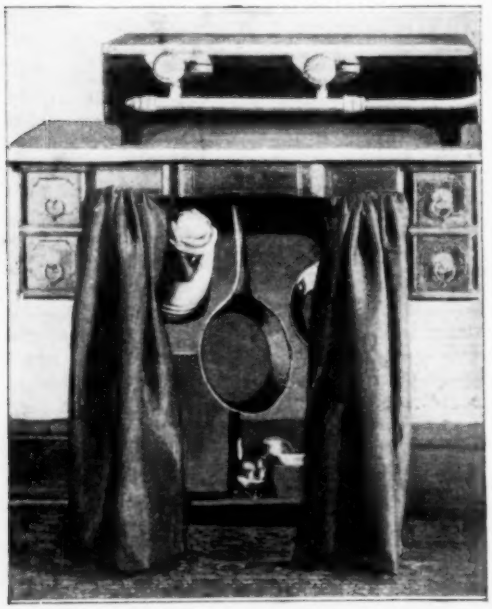
MATERIAL REQUIRED

2 pieces, 11¾ by 2½ in., for sides.
2 pieces, 2½ by 2½ in., for ends.
1 piece, 11¾ by 3½ in., for back.
1 piece, 8¾ by 3½ in., for door.
1 piece, 2 by 3½ in., below door.
1 piece, 1 by 3½ in., above door.
All ½ in. thick.

The instrument should be placed in a sheltered position, and so protected that rain cannot enter the box.

Kitchen Cabinet Made from Old Sewing Machine

By adding a few inexpensive items to an old sewing machine, which had been stripped of its mechanism, a business woman, who keeps house in a single room, provided herself with a compact



Converting an Old Sewing Machine into the Kitchen Cabinet Pictured Here Requires Very Little Material or Labor

and convenient kitchen cabinet. The top was covered with a sheet of asbestos, to the underside of which was glued a piece of muslin of the same size, so as to prevent the asbestos from breaking. On this fireproof material, a two-burner gas plate was installed. Small cooking and eating utensils are kept in the drawers, while larger articles, such as skillets, pots, and pans, are hung on hooks underneath the top. Near the bottom, two slats that rest on the iron frame support a large tin bread box, in which are stored groceries and other supplies. Denim curtains, strung on a wire, make it possible to cover the lower part of the cabinet and the articles it contains.

When Patterns are Made Too Thin

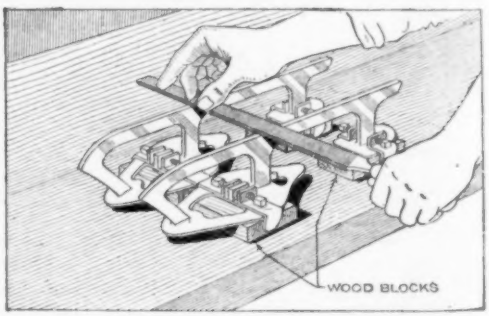
Patterns for ornamental iron, stove plates, and other similar castings, can be increased in thickness, if made too thin, by an extremely simple process. A coat of shellac varnish is spread on the back of the pattern, and a piece of muslin or cheesecloth, cut to the proper size, is then laid on the shellacked surface, and pressed into all the inequalities. When the varnish has dried, another piece of cloth is applied in the same manner. This operation is repeated until the pattern has been made as thick as desired, when the superfluous cloth is trimmed off, and the pattern coated with beeswax.

Removing Particles from the Eye

In removing a small particle of steel from the eye, when the magnet has failed, a draftsman's pen is an excellent instrument to try. The pen should be perfectly clean, as should everything else used about the eye, and should be used only by a person whose hands are not affected by nervousness. The points can be brought together either by turning the adjusting screw, or by squeezing the blades with the fingers. The attempt should, of course, never be made if it is possible to summon a physician.—Conley W. Richardson, Volney, Va.

File Skates Both at Once

In sharpening skates, it is important that the file be held at right angles to the runners. This is difficult when a single skate is held in a vise in the usual way, but easy when the method shown in the drawing is employed. Four blocks

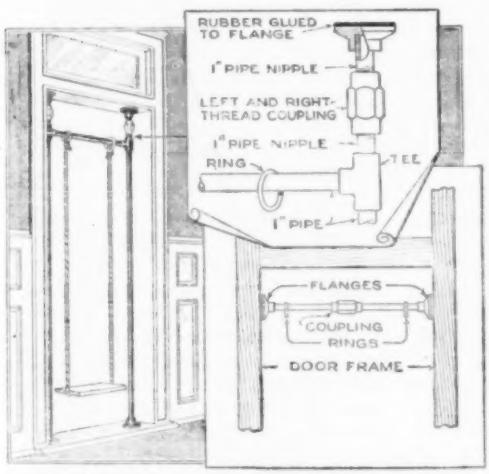


Better Results are Obtained When Skates are Sharpened by This Method. Two Runners can be Filed at One Time in an Accurate Manner

of wood are nailed to a bench, or other surface, so that a pair of skates can be fastened to them, runners up, by means of the heel and toe clamps. Both runners can then be filed at one time, and it is almost impossible to round the edges, as often happens when a vise is used. The runners should be parallel, and on exactly the same level.

Swing Built in House Door

Two inexpensive devices, which can be used for installing a children's swing in a house doorway, are shown in the illustration. Both are made from iron pipe and fittings, and can be put in place in a few seconds, or removed as quickly, without marring the finish of the door casing. In the lower right-hand corner of the sketch is shown a horizontal bar, intended to be placed near the top of a doorway. The material required for this bar includes two flanges, a long left and right-thread coupling, two lengths of pipe, and two iron rings. These parts are assembled by screwing the pipes into the coupling, and placing the flanges on the opposite ends of the pipes. The rings are slipped on the latter before the flanges are attached. Sheet rubber is glued to the flanges. When the coupling is turned, the bar is extended, and the flanges pressed against the jambs of the doorway, holding the bar securely in position. The swing ropes are tied to the rings. On the left is shown a horizontal bar, supported by two uprights. A detailed drawing of the upper ends of the latter can be seen in



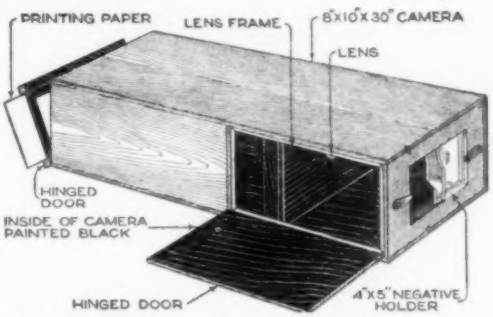
Devices for Supporting a Children's Swing in a Doorway. These can be Installed in a Few Seconds, and will Not Injure the Finish of the Door Casing

the upper right-hand corner. If desired, the couplings can be placed below the tees which hold the horizontal bar. This form of the swing, though more complicated, is to be preferred as being safer.

¶A dishpan, filled with water and left standing in a recently painted room, will lessen the disagreeable odor.

How to Make an Enlarging Camera

The problem of an enlarging camera need not long perplex the ingenious amateur. First, make a box, 8 by 10 by 30 in., from boards, ¼ in. thick. Line the doors with felt, or place strips of tin to cut off the light, and paint the inside of the



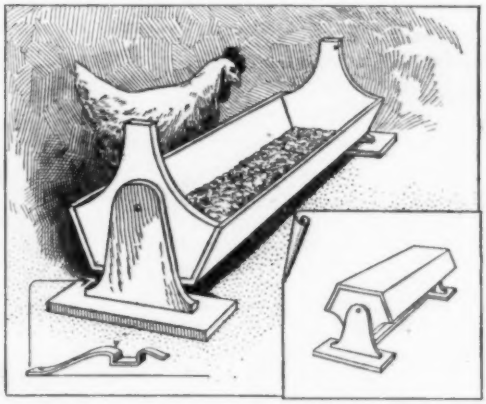
A Simple Enlarging Frame Produces Good Enlargements from Small Negatives at Little Cost

box a dead black. The box has a lens mounted in a board, as shown. The frame of the lens board fits nicely inside the box, and can be moved back and forth, thereby making it possible to focus the image on a ground glass. A common camera lens is used. An auxiliary copying lens can be used with the camera lens for better results, but it is not necessary. The hole for the negative is 4 by 5 in., and is fitted with two glasses between which the negative is placed. The buttons serve to hold the glasses in place. To enlarge from negatives smaller than 4 by 5 in., cover the rest of the opening with a mask of the desired size, cut from thin black paper. Use similar masks in the printing frame when making enlargements smaller than 8 by 10 in., but these masks must be made from cardboard, otherwise they will not hold the printing paper in place. The printing frame is on a hinged door. Tissue paper stretched across the opening can be used for focusing, in place of the more expensive ground glass.

To make an enlargement, put the negative in place, open the back, or printing frame, insert the ground glass, then open the side door, and after throwing a cloth over the head, move the lens board back and forth until the image on the ground glass is of the desired size and sharpness. Then close the side door and go into the dark room, where the enlarging paper is put in the frame. To make the exposure, place the camera near a window not reached by direct sunlight, with the negative end to the light.

Sanitary Feed Trough for Poultry

When not in use, the feeding trough shown in the picture can be turned upside down, in which position it dries without collecting dirt. Scraps of lumber are suitable for making the trough. The catch may be fashioned from a piece of iron strap taken from a packing case or dry-

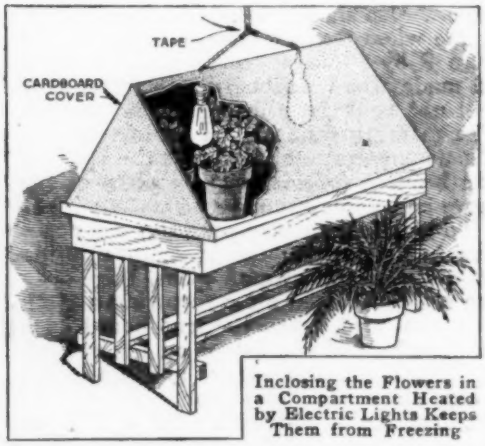


Poultry-Feeding Trough That can be Turned Upside Down When It is Not Filled

goods box. A slight pressure with the foot releases the catch, and the trough automatically falls into position for receiving feed.—E. O. Tetzlaff, Chicago, Ill.

Lamps Keep Flowers from Freezing

Flowers and plants are protected from frost by the device shown in the sketch, which consists of a cardboard cover for



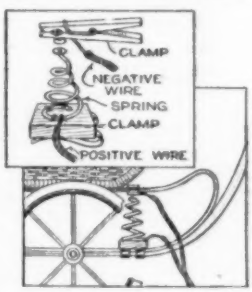
Inclosing the Flowers in a Compartment Heated by Electric Lights Keeps Them from Freezing

a flower stand, fastened together with wire staples, and provided with holes along the ridge, to admit the wires that furnish current for the two electric light bulbs. The heat generated by the latter is sufficient to keep the temperature under the cover above the freezing point, even in the coldest weather.—Dale R. Van Horn, Lincoln, Neb.

Electric Bell Gives Alarm When Baby Becomes Restless

A mother, who lets her baby take the fresh air in its carriage on the front porch while she works inside the house, need have no fear of the baby's crying itself sick, if a signal is arranged which will ring a bell inside the house whenever the child becomes restless.

Such a contrivance may consist of two terminals clamped onto the springs of the carriage in some such manner as shown in the illustration. The coil spring should be light enough so that it has no stiffening effect on the springs of the carriage, and its height should be made such that when the carriage is at rest, the two contact points will not touch. To the lower spring is attached a block, by means of two spring clamps below it. To its upper face is fastened securely with staples the light coil spring, which is connected to one side of the electrical circuit. The upper end of this coil spring may have a washer soldered to it, and makes contact, when the carriage is sprung up and down, with a tack driven into the clothespin which is clamped to the upper side of the carriage spring. This tack is connected to the other side of the circuit. The circuit consists merely of two wires, leading to a battery in series with a bell. If the house is provided with an electric doorbell, wired in such a way that the conductors leading to the push button can be readily got at, it will be sufficient to connect the wires from the baby carriage in parallel with the doorbell push button. A ring, due to the motion of the baby carriage, can then be readily distinguished from an ordinary ring on the doorbell, by the fact that it will be intermittent, with the interval between the successive rings more or less regular, as the carriage bounces.—J. J. Ginsberg, Washington, D. C.



AN AIRPLANE-TYPE SKI GLIDER

By F. D. Burke

THE biplane glider is the simplest and least expensive of motorless airplanes. Mounted on skis, it provides the means for an exhilarating winter sport called "ski gliding." The glider here described, which need not cost more than $25 to build, has a 20-ft. span of upper and lower wing; chord of 4 ft.; gap, 4 ft.; area, 152 sq. ft.; and weight, not over 80 pounds.

Wings

The general dimensions of the wings are given in the assembly, Fig. 1. If material for the wing beams cannot be obtained in the length specified, they can be made up of two pieces spliced in the center. The joints should be made with a good grade of hide glue and two rivets, as shown in Fig. 2. The wing beams are laid out in pairs, each pair being tied together by six compression members and U-bolts, and braced with music wire, as shown in Fig. 3. After the frame of the wing is wired, it should be trued up perfectly square. It is then ready for the ribs. There are 41 of these, 21 in the upper wing and 20 in the lower, the center rib of the lower wing being left out. The ribs are of the dimensions given in Fig. 4; the front end of each should be soaked in boiling water for bending. The minimum depth of the curve should be about 2 in., at a point 18 in. from the leading edge, as shown in Fig. 1. The ribs are fastened to the wing beams as shown in Fig. 4. The front end of each rib is forced tightly into a short length of steel tubing, one end of which is flattened and drilled to take a small wood screw, as shown. The attachment to the rear beam is by means of a narrow strap of light-gauge tin. The rear end of each rib is notched and reinforced with tin to take the wire trailing edge, which is fastened to each rib with small wire staples, as shown.

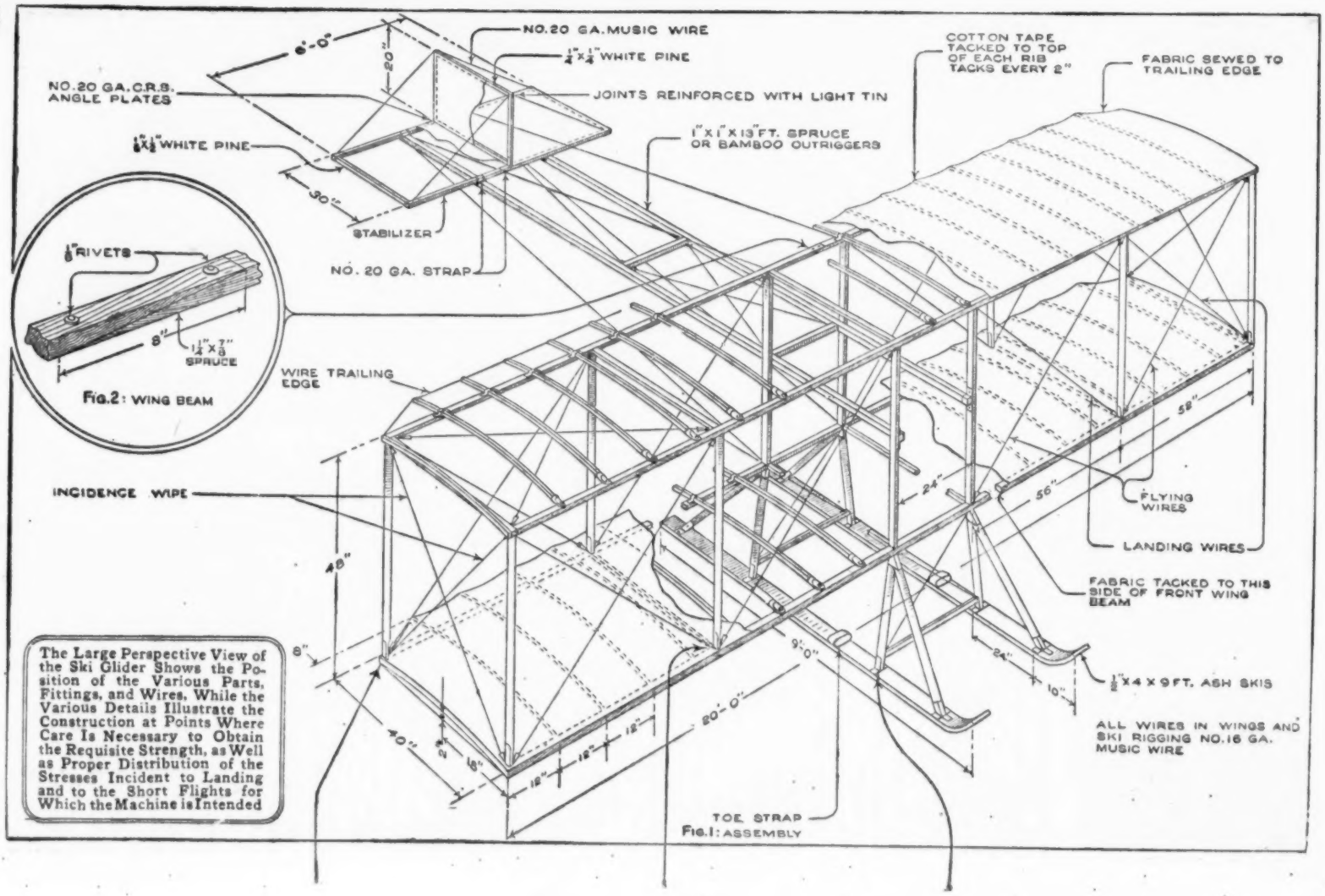
For covering the wings, unbleached cotton sheeting is used. This is sewed to the wire trailing edge, stretched over the ribs, and tacked to the underside of the front beam. Narrow strips of cotton tape are stretched along the top of the ribs, as shown in Fig. 1, and tacked. The wings, when covered, should be given a coat of thin, hot glue, in which 1 or 2 oz. of alum have been dissolved. This will serve to shrink the fabric and make it air-tight. The upper and lower wings are tied together by 12 struts of the shape and dimensions given in Fig. 3; both ends of each strut have a strip of light-gauge tin wrapped around them for reinforcement. The struts are fastened to the wing frames by a one-piece fitting, shown in the upper detail of Fig. 5, and braced with No. 16 gauge music wire. Each wire is provided with a spoke-type of turnbuckle, shown in Figs. 3 and 4, for making adjustments. All turnbuckles should be riveted to the lower-wing fittings, the other end of the wires being attached, by twisting, to the upper-wing fittings, as suggested in Fig. 3.

Outriggers and Tail Plane

The outriggers that carry the tail planes may be made of spruce or bamboo, and are of the dimensions given in Fig. 1. They are bolted to the four center-section struts, and braced with No. 16 gauge music wire, as shown in Fig. 1. The stabilizer is a rectangular plane made up of ½-in. square material, and fastened to the outriggers by four ⅛-in. bolts. The construction of the vertical fin for directional stability is the same as for the stabilizer; it is fastened to the stabilizer by means of four sheet-metal straps, as shown. The tail planes are covered and treated in the same manner as the wings.

Ski Rigging

The ski rigging or "landing gear," shown in Fig. 6, is built on two ash skis, the front ends of which are steamed, or boiled, and slightly bent upward for a distance of 8 or 10 in. Each ski is connected to the lower wing beams by four struts, attached by the metal fittings shown. The length and location of the ski-rigging



The Large Perspective View of the Ski Glider Shows the Position of the Various Parts, Fittings, and Wires, While the Various Details Illustrate the Construction at Points Where Care Is Necessary to Obtain the Requisite Strength, as Well as Proper Distribution of the Stresses Incident to Landing and to the Short Flights for Which the Machine is Intended

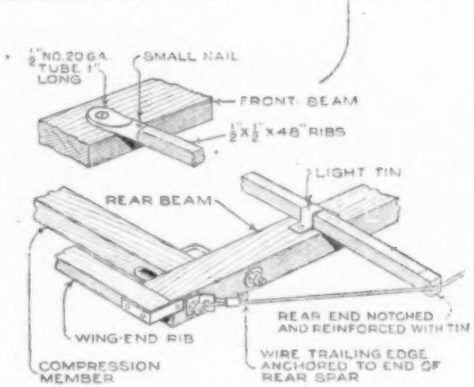


FIG. 4: RIB FASTENING

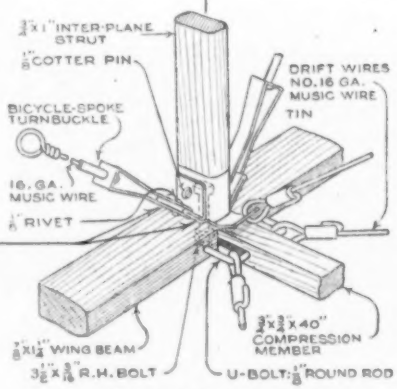
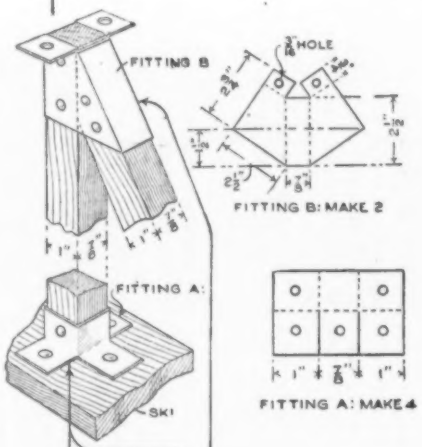
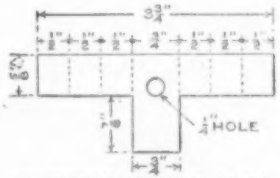


FIG. 3: STRUT FASTENING





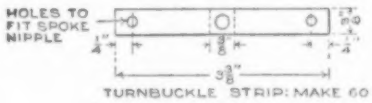


FIG. 5: WING FITTINGS: ALL NO. 20 GA. C.R.S.

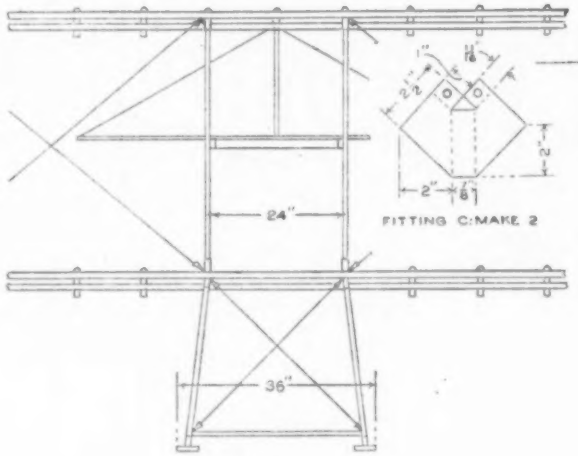
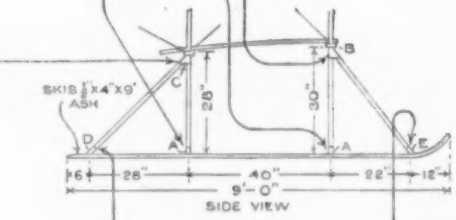
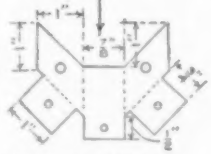
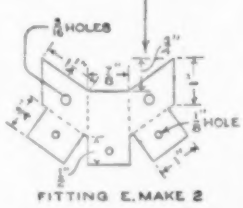


FIG. 7: ELEVATION







ALL FITTINGS NO. 20 GA. C.R.S.

FIG. 6: SKI RIGGING

struts is shown in the side view. These are braced with music wire, as shown in Fig. 1, using straps like the one shown in Fig. 4 for attaching the wires.

Truing Up

The finished glider should be set up with the skis resting on a perfectly level floor. The height of the front beam of the lower wing from the floor should be the same at all six points where the struts occur. This can be accomplished by adjusting the front landing and flying wires. The rear beam should be just 2 in. lower than the front; this can be adjusted by means of the rear landing and flying wires. Plumb bobs should be attached to the front beam of the upper wing, in line with each of the front struts. The upper front beam should then be brought in line with the lower front one, by adjusting the incidence wires.

Testing

The first trials of the glider should be made on a gentle slope. The rider stands upright on the skis, in the open space in the center of the lower wing, about 18 in. back from the end beam. Grasping the front struts of the center section, he starts the glider down the slope. When halfway down, if a good speed has been attained, the weight of the body should be thrown back slightly, and the glider will be lifted off into the air. The balance can be maintained while in the air by shifting the weight from one foot to the other, and by swinging the body forward or backward. The first trials must be made in calm weather; when good control has been secured, subsequent flights should be made directly into the wind, in order to get any considerable distance into the air. The young flier must be urged, above all, to put safety before speed, at least until he has learned to balance the glider against gusts of wind, by throwing his weight to right or to left. Other secrets will come by practice in handling the glider.

MATERIAL REQUIRED

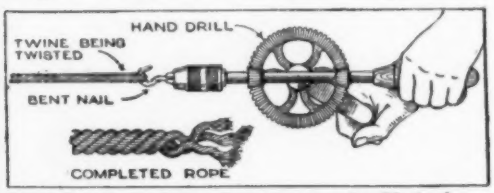
Wing beams, 4 pieces of spruce, ⅞ by 1¼ in. by 20 ft., or 8 pieces of spruce, ⅞ by 1¼ in. by 11 ft.
Inter-plane struts, 12 pieces of spruce, ¾ by 1 by 48 in.
Compression members, 12 pieces of spruce, ¾ by ¾ by 40 in.
Ribs, 41 pieces of spruce, ½ by ½ by 48 in.
Outriggers, 2 pieces of spruce, ⅞ by ⅞ in. by 13 ft.
Tail plane, 8 pieces of spruce, ½ by ½ in. by 6 ft.
Landing gear, 8 pieces of spruce, ⅞ by 1 by 36 in.
Skis, 2 pieces of ash, ½ by 4 in. by 9 ft.
2 sq. ft. of light-gauge tin.
5 sq. ft. of No. 20 gauge cold-rolled sheet metal.
3 lb. of No. 16 gauge music wire.
60 stove bolts, 5/16 by 1½ in., fitted with nuts and washers.
60 heavy bicycle spokes, for turnbuckles.
10 ft. of ⅛-in. round steel rod for U-boats.
24 cotter pins, ⅛ by 1 in., for attaching struts to wing fittings.
5 ft. of 5/16-in. O. D. copper tubing for ferrules around loops in music wire.
14 yd. 60-in. width, unbleached cotton sheeting, for covering surfaces.

(Note: If spruce is not obtainable, bamboo may be used for the outriggers, and white pine for the other parts where spruce is specified.)

Making Rope at Home

With the aid of an ordinary hand drill, serviceable rope up to ½ in. in diameter may be easily made of binder twine.

To make a ⅜-in. rope, first cut four lengths of twine, one-fourth longer than the length of rope wanted. After fastening one end, pull the four strands out tight, tie the other end into a knot, and hook it into a hook made by placing a small nail in the jaws of the drill, and bending it. The strands are then twisted under a stiff pull, until the cord begins to kink, care being taken to keep the strands tight. Remove the hook with the strand still on, place under a weight to prevent untwisting, and make two more strands in the same way.



Stout Ropes in Short Lengths can be Made from Twine, by the Use of a Hand Drill

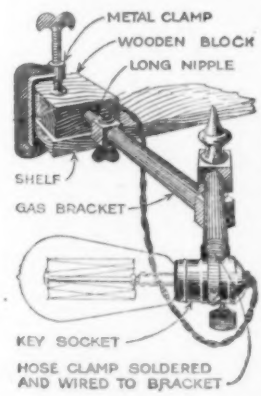
The three strands are now taken up together, and all hooked on to one hook in the drill. The handle of the drill is turned in the opposite direction until the cords are well twisted. Upon removing from the hook, it will be found that they stay twisted, as in any rope. The tighter the strands are twisted at first, the more compact and the stronger the rope will be. In the same way, the writer has made serviceable cord from cotton string, and even fishing line, using linen or silk, and then waxing.

"Solid" Bicycle Tires

Old bicycle tires can be rendered puncture-proof by an extremely simple and inexpensive treatment. Scrap rubber of almost any description is cut into small pieces, none larger than ½ in. square. A slit, about 4 in. long, is made in the tire on the side which fits on the rim, and while this is held open by a short length of stiff wire, the bits of rubber are forced through it into the casing, and pushed as far as possible away from the opening. The hole is then closed by tying a piece of string around the tire. Another slit is cut about 10 in. from the first, and the same operation performed again. This is continued until the entire casing is packed with the rubber chunks, when the strings holding the edges of the slits together are removed, and the tire placed on the wheel rim. After the bicycle is ridden a short distance, more rubber can be placed in it. This makes it practically solid. It can then be cemented to the rim. A tire treated in this manner will not ride quite as easily as a pneumatic tire, but it protects the rim from injury at slight cost.

Electric-Light Fixtures Made from Gas Brackets

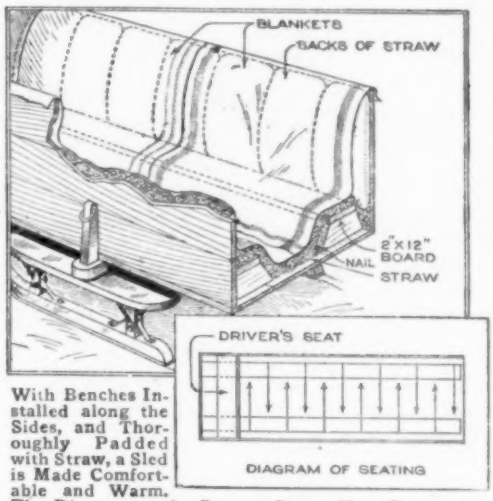
In a factory which had discarded gas illumination, a number of the abandoned fixtures were collected by one of the employes for use as electric-light brackets in his home. The sketch shows how each fixture was attached to a shelf, or other woodwork. A small block of wood was clamped to the shelf, and one end of a long nipple was screwed into it, while the other end supported the bracket. A hose clamp was soldered to the burner end of the bracket and made additionally secure with wire, so that it was strong enough to hold an electric-light socket. Each bracket was double-jointed, which added greatly to the convenience of the arrangement, as the light could be set in a variety of positions, for shaving, reading, cooking, or any other purpose.



Making a Sleigh Ride Comfortable

Many sleighing parties are rendered unpleasant because the bobsled or sleigh is not properly equipped to keep its occupants warm during a long ride. Certain simple preparations will remedy this discomfort. Low benches, made from 2 by 12-in. planks, supported at either end by blocks of wood, are installed along both sides of the sled. Passengers seated on these can brace themselves by placing their feet against the bench on the opposite side. This lessens the effect of the jolts caused by rough roads. A seat is provided for the driver by placing a board across the front ends of the lengthwise benches, and adding a back rest to this. The sides of the sled body should be extended high enough to shield the occupants from the wind, but not so high as to interfere with their view of the country through which they pass. The bottom of the sled, as well as the benches, are covered with about 1 ft. of straw, over which heavy blankets are spread. Sacks filled with straw are fastened to the sides and ends, and serve as back cushions. With a sled prepared in this manner, foot warmers are unnecessary, as the heat from the occupants' bodies will be sufficient to keep the party warm, if the members are covered with blankets.

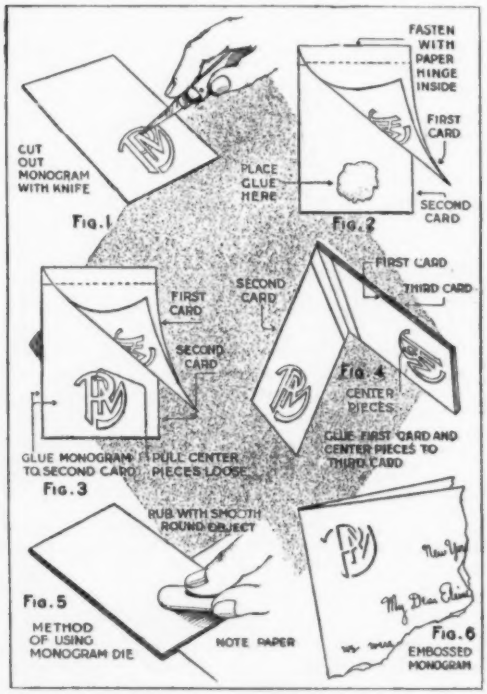
For use in case the vehicle is overturned, two scantlings, 2 by 4 in. and as long as the sled, should be carried. By employing these as levers, the sled can be righted very easily.—J. Horace Van Nice, Chicago, Ill.



With Benches Installed along the Sides, and Thoroughly Padded with Straw, a Sled is Made Comfortable and Warm. The Diagram at the Bottom Shows How Passengers should be Seated

Paper Die Embosses Monograms

With a simple paper die made from three visiting cards, it is easy to emboss



The Various Figures Show the Successive Steps in Making a Monogram Die from Three Visiting Cards

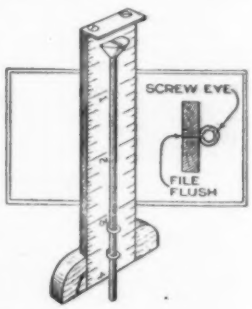
a monogram or other design on stationery, or upon the leaves of books. Besides the cards, some good mucilage or liquid glue will be required, and a very sharp-pointed knife.

The successive steps of making the die are shown in the illustration. First, lay one of the cards on the table, sketch in the monogram with a lead pencil, and cut it out with the knife point, as shown in Fig. 1. An old magazine, a board, or a piece of glass should be laid under the card while this is done, so as to give a clear sharp cut. Do not remove from the card the pieces which have been cut out. The second of the three cards is now placed underneath the first one, and they are bound together with a paper hinge glued to the inside, as shown in Fig. 2. When the glue on this hinge is firmly set, put some glue on the second card, right below the monogram, press the cards together, and let the parts constituting the letters themselves stick upon the second card, as shown in Fig. 3. Any inside pieces which are severed entirely from the body of the monogram, such as the insides of the letters "O," "D," or "P," must not be permitted to stick to the glue on the second card, but must be pulled loose. When the main body of the monogram is firmly attached to the second card, these center pieces are replaced, and a small amount of glue is placed on their top surfaces. The first or upper card is now brought down upon the second, and glue is spread on the top surface. The third visiting card is then placed on top so that the first card and the small center pieces will adhere to it, as shown in Fig. 4. The die, thus completed, is now folded out open at the hinge, and is placed in a large book or under a weight till the glue is hard.

In use, place the paper to be embossed between the upper and lower halves of the die, and press them together with some smooth round object, such as the end of a closed penknife. A rubber eraser can also be used to press the die together, but is not so good as a round hard object which can be rubbed over the card, as shown in Fig. 5. Fig. 6 shows the appearance of the completed embossed monogram.

Depth Gauge Made from Broken Rule

The depth gauge illustrated can be made from a long bolt and a piece of a broken wooden rule. It is very easy to read, and may be made fairly accurate. The bolt is attached to the rule by two screw eyes, through which it should slide with not too much play. The head should be wide enough so that the graduations on the rule can be compared with it, and the length of the bolt should be such that the point at which the top of the head lies against the rule will indicate the amount which its opposite end projects below the lower end of the rule. A short crossarm at the bottom will increase the usefulness of the instrument, and a piece at the top will keep the bolt from falling out and getting lost. A scale having different kinds of graduation on the two edges is preferable, as the reading can then be taken on either. —J. E. Noble, Portsmouth, Ontario, Can.

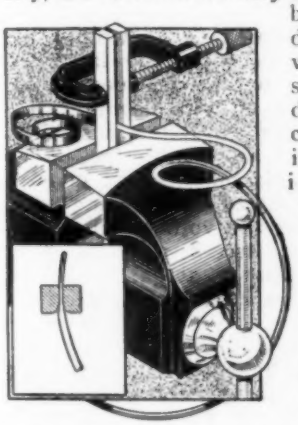


Cement for Cracked Stoves

Stoves often become cracked when exposed to excessive heat. A cement that will repair these cracks, so that the stove will operate efficiently, may be made by mixing a thick paste from wood ashes and the white of eggs. No coal ashes must enter the mixture. Fill the cracks with the paste, making the edges smooth and even. When once hardened, this cement will give long service.—James C. Bailey, Peru, Ind.

Simple Wire-Drawing Device

In making small coiled springs, or jewelry, it is often necessary to make the ribbon stock by drawing out a wire into thin strips. A simple device for accomplishing this is shown in the illustration. Two bars of steel, ⅜ in. wide by ¼ in. thick, and about 2 in. long, are rounded off along one edge and placed side by side in a vise so that the two rounded edges face each other.

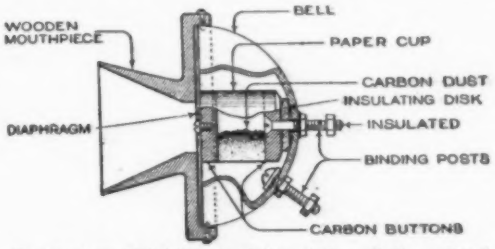


The piece of wire to be drawn is then flattened at one end and inserted between the two bars, on the side where the adjacent rounded edges form a groove. After it has been pushed through so that it projects about ½ in., a clamp is screwed against the two steel blocks, forcing them together. Now, by grasping the flattened end of the wire with a pair of pincers and pulling, it is thinned out as it is drawn through. By repeating the operation, clamping the bars tighter each time, a ribbon of any desired thickness may be obtained.—Earl B. Forrester, Somerville, Massachusetts.

Easily Made Telephone Transmitter

The transmitter shown in the accompanying cut can be made almost entirely from parts taken from a worn-out electric bell, and those which can be taken from an exhausted dry cell.

The back of the transmitter is the bell proper, and serves as a casing for the various parts. The two contact buttons are obtained by sawing off pieces from the end of a carbon electrode, taken from



Parts of an Old Electric Bell and Dry Cell are Used in This Telephone Transmitter or Microphone

an old dry cell or from an electric-light carbon. Each should be drilled through its center, one to take a small machine screw tightly, and the other to receive a binding post, which may be taken from the dry cell, or may be purchased separate.

Before attaching the rear button, an insulating washer should be cut from a piece of fiber or leather, and slipped over the binding post, as shown, care being taken that the washer is large enough to keep the button from making contact with the bell. After preparing a small paper tube to insulate the screw from the bell, the button and binding post may be put in place, a second insulating washer applied on the outside, and the whole drawn firmly together with a nut as shown.

The next step is to cut out a diaphragm from a piece of ferrotype tin, commonly known as tintype. After drilling a hole through the center, one side is scraped carefully, so as to afford a good contact, and the second button is fastened to it with a small screw.

The carbon dust, which forms the variable resistance, is obtained by crushing the carbon electrode from the discarded cell until the fragments are about the size of a pinhead. After the finer particles have been removed with a sieve, the remainder is poured into a paper cup, just large enough to slip easily over the two carbon buttons, and about ⅛ in. less in length than the depth of the bell.

This completes the instrument with the exception of the mouthpiece, which may be turned out of wood on a lathe, making the flange along the rim of such a diameter that it will fit snugly over the bell, when assembled. In operation, the two leads are connected to the two binding posts, and the remaining circuit is formed, as usual.

How to Build Small Transformers

By JOHN A. PRIOR

IN this day of the alternating current, it seems strange that so few amateur electricians try their hand at the small step-down transformer. This apparatus,

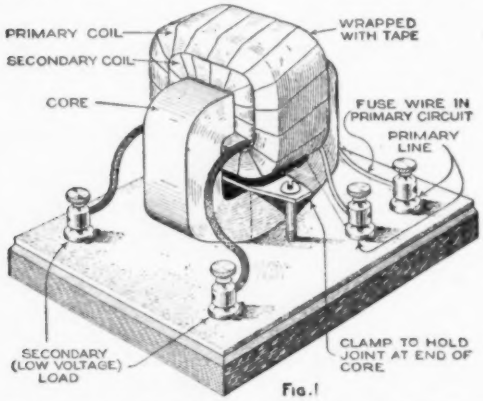


Fig. 1

The Single-Coil Type of Transformer Has One Primary and One Secondary Coil, Wound on a Core of Sheet-Iron and Paper Strips

working on any alternating-current circuit, will successfully supplant batteries for many purposes, from ringing doorbells and running toys to heating, soldering, and even spot-welding on a small scale. The transformer is very simple in construction, consisting of but three essential parts: two windings mounted on a soft-iron core. Compared with the induction coil, the low-voltage transformer of small size presents very few difficulties.

The biggest difficulty, really, lies in finding the essential particulars of size and proportion. Haphazard methods are not likely to produce good results—at least, not the results expected—and the computation of the correct proportions is a job in itself. All the necessary data may be readily extracted from Tables I and II, for sizes from 25 to 500-volt-amperes output. Smaller sizes can be made, but they are likely to be of more value as an object lesson in the unfortunate effect of low power factor, than as a source of power. These ratings are not hard and fast, of course. The practical limit to the output of a transformer is overheating from resistance losses; hence, if the transformer is used intermittently, with plenty of chance to cool off, its maximum output may be very much higher than these figures. The table is based on a frequency of 60 cycles; lower frequencies would decrease the output, and higher frequencies increase it.

All transformers are made with laminated cores, to reduce the eddy-current losses. In commercial transformers, punched laminations are used, and to copy this construction by hand is a tedious job. Much of the work can be avoided by building up the core of plain strips, bent to shape; the result is shown in Fig. 1. While not handsome, it will be nearly as effective as the usual form, since magnetic flux has no eye for beauty along its path. The core is merely a bundle of strips of soft sheet iron, of any thickness which will bend easily, as shown in Fig. 2. Between the strips of metal are thin paper strips; or varnish may be used, if care is taken to leave the ends of the strips bare, where they are to overlap.

The secondary coil may be wound directly on the core, after the latter is taped. It may be out of the question to get the large size of wire listed in the table; if so, a bundle of enough smaller wires to give the same cross-section is just as good. This bundle may consist of bare wires, insulated by wrapping with paper or tape, for the voltage difference between adjacent layers is very low. Too much insulation is actually a detriment, for excessive bulk means a longer primary winding.

The primary coil is best wound separately, on a form built up of pasteboard. After the coil is completely wound, the pasteboard form is torn off a little at a time, and the coil wrapped securely with tape, as the form is removed. The coil must of course be large enough so that it can be slipped on over the secondary.

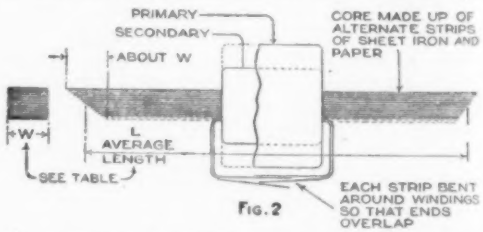


Fig. 2

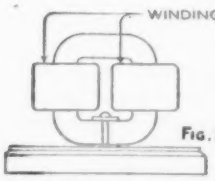


Fig. 3

In Fig. 2, Above, are Shown the Coils in Position on the Core, Before the Latter is Bent to Its Final Shape. To the Left, in Fig. 3, the Arrangement of Coils in the Double-Coil Transformers is Illustrated Diagrammatically

For this primary winding, cotton-covered magnet wire is best; each layer may be shellacked as wound. Here again, bulk must be avoided; even bell wire is prefer-

able to rubber-covered or other thickly insulated kinds, since the difference in potential between adjacent turns can hardly exceed 25 volts.

Now, with both windings in place, the core can be finished. The object to be borne in mind is, of course, to provide a magnetic path as good and short as possible. The ends of each separate iron strip are bent around the coils, as closely as convenient, as shown by the dotted lines in Fig. 2. They should then be cut off so as to overlap only a short distance —say, from ½ to 1 in., depending on size. The paper strips are cut off so as to give a metal-to-metal contact between ends of the same strip—not between one strip and another. The more iron has to be cut off the better, for the shorter the core, the higher the power factor of the primary. Finally, the ends of the laminations are clamped together by some convenient means, as in Fig. 1.

In the case of the larger sizes (see Table III), for which double sets of coils are recommended, the construction is the same, except that the two sets of coils are arranged on opposite sides of the ring formed by the core, as shown in Fig. 3, with the primaries connected in parallel to the line for maximum output. Other voltages may be obtained, as indicated in Table III. Of course, two or more secondary windings may be put on the smaller sizes as well, if it is desired to have more than one terminal voltage available.

For a base, something of the nature of a fiber plate on a wooden subbase is good. Binding posts, etc., are matters of choice. A fuse should always be included in the primary circuit, to protect the lighting-circuit fuses in case of a short in the secondary, for a very small transformer will draw a very heavy current—until it melts or burns up, if not provided with a fuse. A short circuit in the secondary has practically the same effect as one in the primary.

It is also a good plan to solder permanently to the primary terminals a flexible lamp cord with a plug, to prevent the possibility of the transformer being connected up backward by mistake. Connecting the low-voltage coil to the high-voltage line would burn it out at once.

SMALL TRANSFORMER DATA		TABLE I. Primary Voltage 110						TABLE II. Primary Voltage 220					
RATED OUTPUT, at 60 cycles—volt-amperes		25	50	75	100	150	250	25	50	75	100	150	250
PRIMARY WINDING	Wire Gauge No.	25	23	20	18	16	13	28	26	23	21	19	16
	" diameter, In.	.018	.023	.032	.041	.051	.072	.013	.016	.023	.028	.036	.051
	Number of turns	570	475	340	285	228	190	1140	950	680	570	456	380
	*Approximate length, Ft.	550	475	380	325	275	250	1100	1000	800	675	550	500
SECONDARY WINDING (1)	for 6 volts— Wire Gauge No.	12	10	7	5	3	0	All secondary data same as 110 volts for same secondary voltage.					
	" diameter, In.	.081	.102	.144	.182	.229	.325						
	Number of turns (in series)	30	25	18	15	12	10						
(2)	for 12 volts— Wire Gauge No.	15	13	10	8	6	3						
	" diameter, In.	.057	.072	.102	.129	.162	.229						
	Number of turns (in series)	60	50	36	30	24	20						
CORE	Width (W, Fig. 2) In.	1⅜	1½	1⅝	2	2⅛	2½	Core same as 110 volts, for same output.					
	Av. length (L, Fig. 2) In.	9	10	11.5	12.5	14	18						
	Weight of iron, Lb.	3	4	6¼	8¼	11	20						

*Length approximate; depends on thickness of insulation. Excessively thick insulation should be avoided, especially in smaller sizes, and in secondary windings.

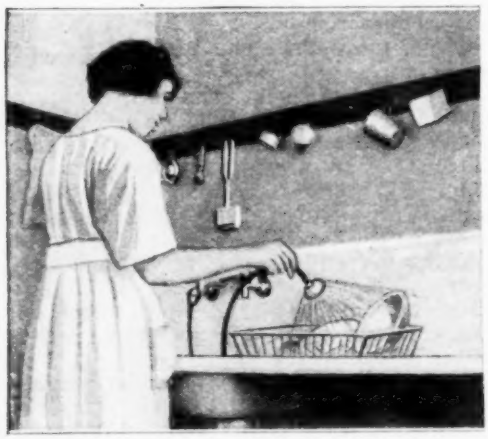
TABLE III.—LARGER SIZES. (200, 300, 500 volt-amperes.) (See Tables I and II for windings, etc.)

Capacity of any size, in Tables I or II, may be doubled, with improvement in efficiency, by use of two sets of windings (same as those of size to be doubled), connected in parallel for the maximum output. Add 25 per cent to length of core; otherwise, same as size to be doubled. Three different terminal voltages may be obtained, by the following connections:

Primary volts	110 or 220	110-220	110-220
Primaries connected in	Parallel	Parallel	Series
Secondaries connected in	Parallel	Series	Parallel
Sec. volts (6-volt winding)	6	12	3
Sec. volts (12-volt winding)	12	24	6

Shower-Spray Nozzle Rinses Dishes

An ordinary bath spray, consisting of a rubber tube and a nozzle, is a convenience in the kitchen as well as in the bathroom.

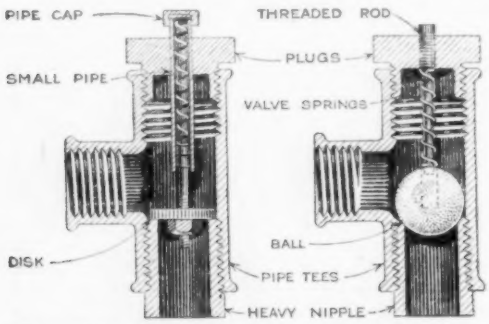


Dishes can be Rinsed Thoroughly with an Ordinary Bath Spray When the Latter is Attached to a Hot-Water Faucet

In the former it can be utilized for rinsing dishes by attaching the tube to a hot-water faucet. The dishes should be placed in a wire tray in the sink. This method saves labor and time.—Shirely Ware, Chicago, Ill.

Check Valves in Pipe Tees

A convenient and very inexpensive type of check valve can be built in an ordinary iron-pipe tee. Such a valve must not be used for acids and other substances which will corrode iron, but brass tees in iron-pipe sizes can be obtained if necessary. The valve to the left is made with a disk which



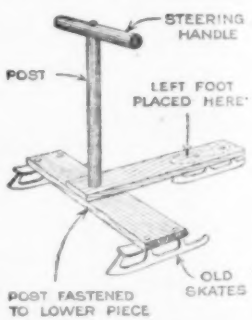
Check Valves Built in Ordinary Pipe Tees: The Valve at the Left Uses a Disk, and the One at the Right a Ball, Both Seating on an Extra-Heavy Nipple

seats against the flat surface cut on the heavy nipple at the bottom, while the one at the right uses a ball, fitting into a seat which must also be machined in the end of the nipple. If either valve is used upright, in the position illustrated, the spring is not necessary, unless high pressures are to be handled. If they are to be used sideways, however, springs will be necessary. In the valve at the left, the disk may be of iron with the small rod threaded through it. If the valve is to be used for air, or in cold weather, the nut should be unscrewed, and a leather or rubber washer placed between the iron disk and the valve seat. A regular valve disk of hard composition material may be used instead of leather or rubber. If the valve seat on the end of the nipple gets rough, it can be readily removed and refaced. At the upper end of the tee is a plug, through which is threaded a small piece of iron pipe which contains the valve spring and rod, and is provided with a cap on its upper end.

The valve at the right is quite similar, except that the rod does not move with the valve, the ball being drilled out so that it slides up on the threaded rod.

Ice Glider Made from Old Skates

A great deal of sport can be had with an ice glider, which is easily made from three old skates and a few pieces of wood. The skates are bolted on two 1-in. boards, 6 in. wide by 24 in. long, as indicated in the sketch. The steering post, 24 in. long, passes through a hole in the top board, and is fastened securely to the bottom board. On top of the post is a handle, 12 in. long, which is held in place by a long screw. The left foot is placed on the top board, and the right foot used to push the glider. The steering handle makes it possible to guide the contrivance in any direction.



Bottle Caps on Shoe Prevent Slipping

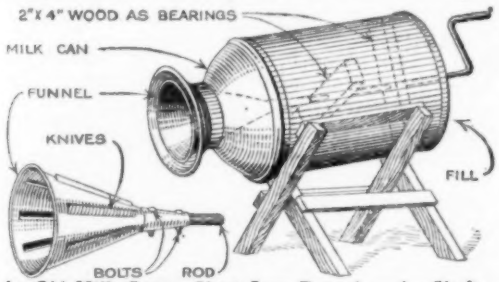
Common crown bottle caps, if nailed to the soles and heels of shoes, will prevent the wearer from slipping on wet floors or ice-covered sidewalks. The tops of the caps should be fastened next to the leather, for the best results.

Real Flowers on Ladies' Hats

Real flowers can be used as trimming for women's hats, if preserved by a very simple method. Cotton is soaked in a mixture composed of equal parts of water and vinegar, and then wrapped around the ends of the flower stems. Tin foil is placed over the wet cotton to retain the moisture, and to prevent damage to the hat. Flowers treated in this manner will remain fresh for several hours.—S. Leonard Bastin, Bournemouth, England.

Root Slicer Made from Milk Can

By adding a few easily made parts to an old milk can, a chicken breeder provided himself with a simple root and vegetable slicer, which quickly prepares feed for the fowls with only a small amount of labor. A sheet-iron funnel, slightly smaller in diameter at its large end than the mouth of the can, was converted into a slicing tool by making six longitudinal cuts in its sides with a chisel, bending the metal outward as shown in the illustration, and sharpening the edges of the tangent knives thus formed with a file. The slicer was fastened securely to the end of a ½-in. shaft, 3 ft. long. This was done by bolting the funnel to the shaft, and pouring lead in the space around the bolts. After the bottom of the can had been removed, the funnel and shaft were placed inside, where they were supported by tight-fitting wooden bearings, installed as indicated in the drawing.

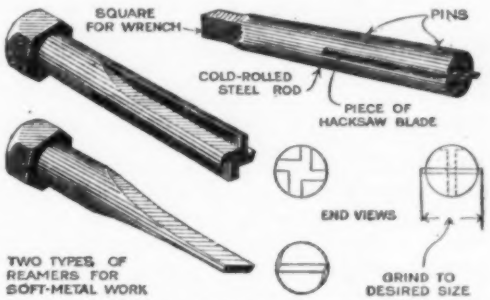


An Old Milk Can, a Sheet-Iron Funnel, and a Shaft Are the Important Parts of This Root and Vegetable Slicer

The shaft was bent to provide an operating crank at the end opposite the slicing tool. A wooden horse holds the device in a tilted position, with the mouth of the can lower than the other end. Material to be sliced is placed in the can at the higher end, and slides down to the slicing tool, which is revolved by turning the crank. The slices are collected in a vessel set underneath the mouth of the can.

Improvised Bushing Reamers

When bushings are renewed in such parts of the automobile as the steering-gear joints, the spring and brake connections, or others, the amateur repairman will find it difficult to enlarge the openings for pivot pins or bolts, unless he has



Reamers Suitable for Enlarging the Holes in Bushings can be Made from Bolts, or Pieces of Steel Rod, with Very Little Labor

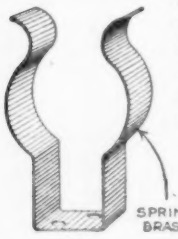
a large assortment of reamers. However, the latter can be improvised easily. If a bolt or pin is to be replaced, the old one can be fluted on the emery wheel, or shaped like a wedge on the grindstone, and used as a reamer. Cold-rolled steel of the proper diameter will serve instead of a bolt or pin, if treated in the same manner. Another type of reamer, applicable also to work in iron, is made by sawing a slot in a piece of steel rod, and fastening a section of hacksaw blade in the slot with pins or small screws. The blade is then ground to the correct width, and slightly tapered at the entering end. The opposite end of the rod is ground square to permit the attachment of a wrench.—G. A. Luers, Washington, D. C.

Light for Motorcycle Repairs

Here is a little information that may prove valuable to motorists who are forced to make repairs on the road at night. I was placed in that position not long ago when the chain of my motorcycle broke on a country road, where no light was available except that produced by the headlight of the machine. This, of course, was projected forward, and did not serve to illuminate the scene of operations. Finally I conceived the idea of placing a sheet of white paper in front of the headlight, and extending it a few inches to the side on which the work was to be done. This simple reflector provided ample light.—Ed. Jacobitz, Grand Rapids, Mich.

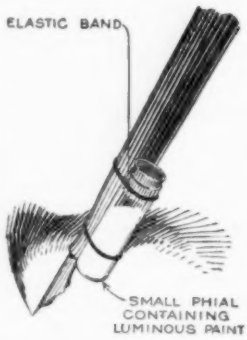
Holder for Electric Light

At one time the writer lived in a room with but one electric light on a drop cord. Sometimes it was desired to have the light at various places in the room, so several holders were made of spring brass and fastened at different places about the room—at the desk, table, and bed, so that to change the location of the light took but a moment. The lamp socket is gripped between the two spring arms, holding it firmly.—Douglas Aitken, Marshfield, Ore.



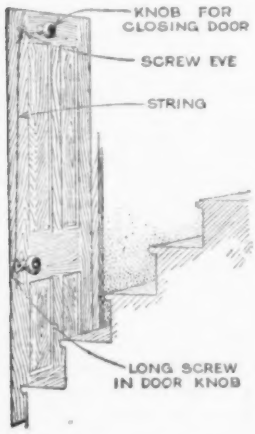
Using Fountain Pen in the Dark

By attaching a small phial of luminous paint to a fountain pen by means of elastic bands, as shown in the illustration, writing can be done in the dark. The contrivance can be applied to an ordinary penholder in the same manner.



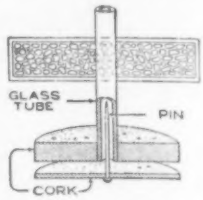
To Save Stooping at Stairway Door

Opening a door at the bottom of a stairway is usually a somewhat difficult operation, due to the location of the door knob, which can be reached only by stooping. This difficulty can be overcome easily. A long screw is substituted for the short one in the doorknob handle, and connected with a screw eye near the top of the door by means of a string. The screw acts as a lever to turn the knob when the string is pulled. Even in the dark, it is easy to find the string by passing the hand over the surface of the door. A knob may be fastened beside the screw eye, to be used for closing the door.—W. W. Parker, Spearfish, S. D.



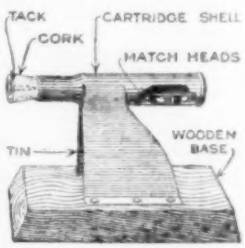
An Air-Suction Trick

A simple experiment demonstrates a peculiar condition produced by a sudden decrease of atmospheric density. Thrust a glass tube through a cork of large diameter, until its end is flush with the other side. Then run a pin through a thin layer of cork and insert it in the tube. Blow a current of air through the tube from the opposite end, and the thin layer will be drawn toward the larger cork, instead of being blown away, as would be expected. The reason is that as soon as the air current strikes the thin cork it spreads radially between the two cork surfaces, and the sudden movement of atmosphere in all directions from the center causes the density to be decreased. On the other side of the cork, the air is at its usual density, and consequently its pressure is greater on that side, causing the cork to move toward the tube.—John C. Jack, Almonte, Ont., Can.



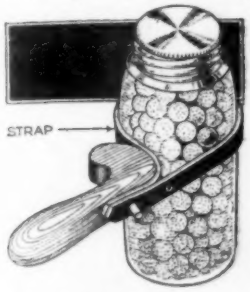
Toy Match Cannon

The illustration shows a toy cannon, the principal part of which is an exploded cartridge shell of rather large caliber. The latter is mounted on a small board, and supported in a horizontal position by a piece of tin, cut and bent as indicated. A tight-fitting cork, weighted with a tack stuck in the center of its larger end, is used as a projectile. The explosive charge consists of two match heads. These are placed in the shell near its closed end, after which the cork is inserted in the mouth. A lighted match or candle, held under the shell at the location of the match heads, ignites the latter, and the cork is expelled. If a larger number of match heads is used, the range of the cannon will be increased.—Carl De Vilbiss, Patterson, Calif.



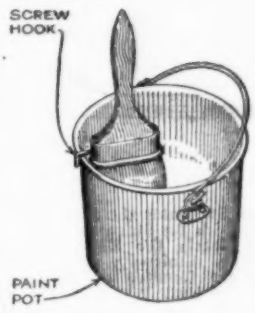
Holder for Glass Fruit Jars

The well-known can opener for removing caps from glass jars does not solve the problem of holding the can during the process. The operation is made easy with an additional tool, made from a piece of wood and a strap. The handle should be rounded at the end where the strap is attached, as shown in the diagram. The ends of the strap are fastened on one side of the handle. The loop is slipped over the can, and when the handle is used as a lever, the can is unable to slip. —Fred Christensen, Columbus, Ohio.



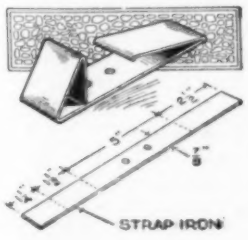
Hook Holds Brush Upright in Pail

By fastening a right-angle screw hook to the side of a paintbrush, as indicated in the sketch, the brush can be hung in an upright position inside a bucket, and will not become overloaded with paint or bent out of shape.



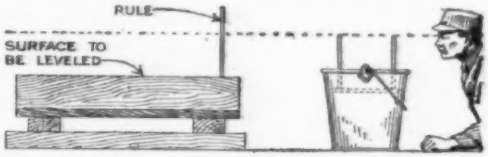
Door Catch Made from Strap Iron

An efficient door catch can be made from a short length of strap iron, or spring steel, by bending it as shown in the illustration. The strip should be about 10 in. long, and ⅞ in. wide. Spring steel is the better material to employ, though it cannot be bent at a sharp angle without breaking. If it is used, the points at which angles are to be made should be heated, and tempered again after the metal is bent. Two or three holes are punched in the device, so that it may be fastened to the floor with screws.—**Forrest Benson**, Boulder, Colo.



Leveling by a Water Float

The improvised substitute for an ordinary level shown in the illustration is a dependable device. To make it, a bucket is filled nearly to the top with water, and

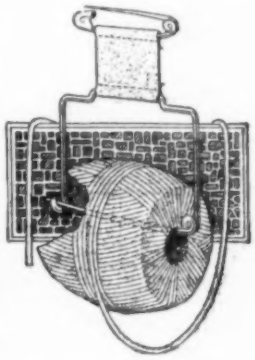


Accurate Results are Obtained with This Level, Which Consists of a Board, Equipped with Two Upright Masts, Floated in a Bucket of Water

a small board, equipped with an upright mast near each end, is placed in the vessel. The contrivance is adjusted by sighting across the tops of the masts at some fixed point, and cutting them off until the line of sight falls on the same spot, when their positions are reversed. The actual leveling is done by holding a rule as a level rod at each corner of the surface to be made level, and raising or lowering the corners until the line of sight over the masts falls on the same point on the rule at all of the corners.

Simple Crochet-Ball Holder

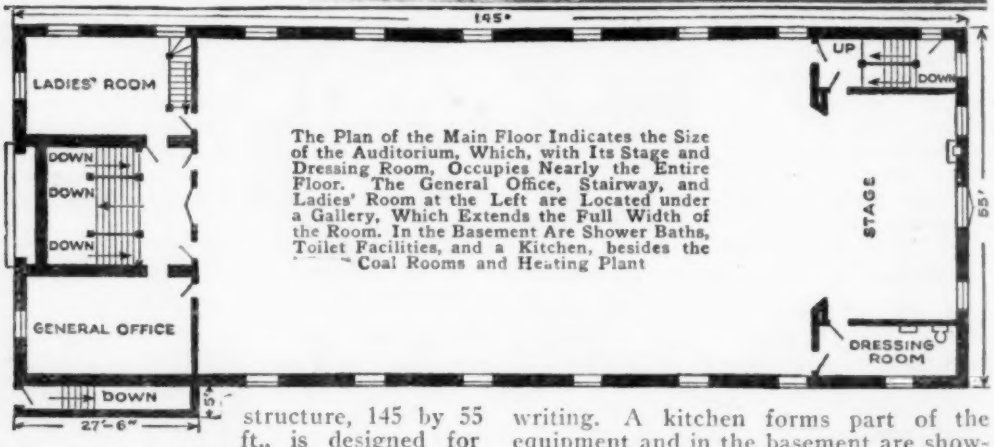
A holder for thread that enables a person crocheting to move about the house, or put aside the work at will, can be made from common spring wire. For the purpose a piece about 12 in. long is bent into the shape of a rectangle, the lower left-hand corner being bent up, hook-shape, to receive the adjacent side of the frame. This carries the ball of thread and is given an extra turn at the end opposite the hook for the sake of springiness. To attach the holder to the person, a small square of cloth is looped about the upper part of the frame and pinned to the apron. As iron rusts easily, and is liable to soil the clothing, the framework should be made of brass. However, if this is not available, rusting may be prevented by wrapping the framework with ribbon, or with adhesive or tire tape.



A MODEL SOLDIER-CIVILIAN COMMUNITY HOUSE

At the Left, View of the Large Auditorium, Cement-Floored and over 50 Feet Wide, with the Stage Opening Visible at the Far End: The Ceiling of the Room Is 22 Feet High. Below Is the Front of the Building Itself, the Attractive Combination of Brick and Limestone being Clearly Shown

SO seriously have the people of Manhattan, Kan., taken their social-center problem, complicated by the proximity of a large military camp, that they have invested $34,500 in the construction of a pretentious community house of limestone-trimmed brick. The



The Plan of the Main Floor Indicates the Size of the Auditorium, Which, with Its Stage and Dressing Room, Occupies Nearly the Entire Floor. The General Office, Stairway, and Ladies' Room at the Left are Located under a Gallery, Which Extends the Full Width of the Room. In the Basement Are Shower Baths, Toilet Facilities, and a Kitchen, besides the Coal Rooms and Heating Plant

structure, 145 by 55 ft., is designed for the use of soldiers and civilians alike. Its chief feature is a huge cement-floored auditorium with a 22-ft. ceiling, equipped with stage and dressing room for dramatic entertainment, with a gallery across one end above the general office, ladies' room, and stairway. Provisions are made for music and dancing, billiards and similar games, reading, and writing. A kitchen forms part of the equipment and in the basement are shower baths and toilet facilities. A large club of business men assisted the city in financing the undertaking, and supplied all the furnishings. As long as the military camp continues its activities, the soldiers have first claim on the use of the house. When the uniforms finally have been laid away, it will revert to the townspeople, and continue to center civic and social affairs.

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